THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

# COMPUTERWORLD

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# HP unveils AT clone

## Word processing package, local network also debut

**By Jeffry Beeler**

SUNNYVALE, Calif. — Hewlett-Packard Co. last week entered the IBM-compatible micro fray with the introduction of an IBM Personal Computer AT look-alike that the company said provides 30% greater performance than its Big Blue equivalent for a 20% to 60% lower price.

Formally unveiled at press conferences in New York and California, HP's single-user Vectra PC micro is based on the Intel Corp. 80286 microprocessor. It supports the Palo Alto, Calif.-based vendor's Advance Write word processing software and its Office Share local network, both of which were also an-

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# Ingres out for IBM VM

**By John Gallant**

ALAMEDA, Calif. — Relational Technology, Inc. last week took aim at the burgeoning information center market with the introduction of an IBM VM-compatible version of its widely used Ingres relational data base management system.

The introduction of Ingres/CMS for VM marks the company's first foray into the IBM world. With an installed base of more than 1,200 Ingres systems, RTI is the leading supplier in the Digital Equipment Corp. VAX DBMS market and in the high-end Unix-based DBMS arena. Company spokesman Randall Livingston said RTI decided to focus on VM, a cornerstone in many information centers, because the information center market is the fastest growing mainframe market segment.

The Ingres/CMS version for VM offers a capability that may help users in multi-

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# New Jersey motorists in software jam

**By Charles Babcock**

TRENTON, N.J. — A bureaucratic snafu of epic proportion has been created for New Jersey drivers, allegedly owing to a system design consultant's inappropriate use of a fourth-generation-language-based application.

As a result, more than a million drivers have been unable to register their cars or have registered them and are incorrectly listed in the state's computers as operating unregistered vehicles. So many New Jersey drivers have been forced to drive without registrations that the state attorney general's office has ordered state police to cease citing drivers for the offense.

The controversial registration system was designed for the New Jersey Department of Motor Vehicles by a consultant under contract from the Price Waterhouse & Co. accounting firm. The consultant used Ideal and the Datacom/DB relational data base management systems, both products of Applied Data Research, Inc. of Princeton, N.J.

The system was designed to notify automatically the state's five million drivers of license and registration renewals and to update daily, instead of weekly, New Jersey's merit rating surcharge system. This system keeps track of violation points against individual drivers and penalizes bad drivers with higher insurance rates.

The Department of Motor Vehicles wanted to expand to 1,000 the number of terminals able to access the system. Instead, officials said, they found the new system foundering with 200 terminals. Response times went from the three to five seconds targeted to as long as five minutes, spokesmen said.

The new $6.5 million system "is simply not

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## TOP OF THE NEWS

**One of the very few minicomputer** vendors without a microcomputer product is about to take a small step in that direction. Prime Computer spokesmen say that the company will "within weeks" introduce a hardware option for its Performance Terminal 200 business terminal that will make the unit compatible with the IBM Personal Computer XT. The option consists of an add-on board and a storage device — either a floppy or a hard disk.

■

**According to West Coast sources,** *Newsweek* magazine's exclusive interview with Apple wunderkind non grata Steve Jobs came about when the weekly gave Jobs an offer he couldn't refuse — his picture on the cover. Jobs' visage was ultimately relegated to the upper right-hand corner of said cover when *Newsweek* editors felt compelled to bump their much-ballyhooed interview and give top cover billing to the Mexican earthquake. This may or may not have compelled Jobs to stretch the exclusivity arrangement by calling a news conference at his Silicon Valley estate the day *Newsweek* hit the stands. **For**

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## PROFILE

# Whiz kid, 22, runs Longman Group operation

**By Paul Korzeniowski**

CHICAGO — Joseph Stith is at an age when most people begin to look for their first job. But Stith is not like most people.

As the 22-year-old computer operations manager at Longman Group U.S.A., Inc., he has a position that many older computer professionals would covet. Stith is overseeing conversion of the company's hardware as Longman Group implements a distributed DP operation (see story page 10).

"Accelerated" best describes the tall, thin, bearded professional's rise to his current position. Stith began taking college-level courses in the summer between his junior and senior years of high school. At the time, he was contemplating a career in physics or science.

An introduction to computers course sparked his interest in DP. That initial course was supplemented with programming courses at the University of Missouri and Washington University in St. Louis.

Stith: He fits Longman's DP bill.

Upon graduation from high school, Stith entered Aurora College in Aurora, Ill. "I was looking for a medium-size college with a good computer science program, and Aurora fit the bill," he said.

At college, he majored in computer science and worked in the college's computer operations department. Aurora College's equipment was from Digital Equipment Corp., so Stith became familiar with DEC's PDP-11 series minicomputers and their operating systems.

Stith's summer courses gave him sufficient credits to graduate at age 20. His first full-time employment was at Moline Corp. in Chicago, where he worked as a maintenance programmer.

The job supplied insight to the type of career he did not want to have. "I wanted to be more involved with the operating system and the design of the computer systems than with simple coding," Stith remarked.

So approximately a year after he joined the company, he began to search

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NEWSPAPER

# Apple split brings bitter charges

## Analysts see upturn despite company rift

By Maura McEnaney

CUPERTINO, Calif. — The bitter rift between Steven Jobs and the company he cofounded may leave Apple Computer, Inc. without its colorful figurehead, but Apple will survive the turmoil, observers said.

The Apple saga raged on last week, when the company sued Jobs and former senior design engineer Richard Page, alleging that the two breached their fiduciary obligations and misappropriated confidential and proprietary information from Apple.

Filed in Santa Clara County Superior Court in California, the suit accused Jobs and Page — one of five Apple managers who resigned last month to join Jobs in the formation of a new venture — of planning a "nefarious scheme" to create a company. The suit said Jobs falsely told the board that his enterprise would not compete with Apple, use any of its proprietary information or hire away key employees. Jobs publicly refuted the allegations and called the suit "absurd." Contacted by *Computerworld* at his home last week, Page refused comment on the suit.

In Stockholm Thursday, Apple President John Sculley told a press conference that Jobs had presented a proposal at a board meeting and explained that his new company would focus on the educational market and would not be a competitor to Apple. According to Sculley, Jobs said he would not take any key employees with him.

Within 24 hours, however, it became known that five key employees were being recruited by Jobs, Sculley said. "When it was evident that very little progress could be made, our company saw it necessary to sue Jobs," Sculley said.

Formerly close to the Apple cofounder, Sculley explained his reason for backing Jobs' removal from operational functions: "Steve Jobs thought it was up to Apple specifically to decide how computers were going to be used. I saw it necessary to open up and let the market decide on the uses."

But despite the Apple cartharsis, analysts are saying things are looking up for the company, particularly in light of Apple's anticipated fourth-quarter earnings. Apple recently announced it expected earnings in the last quarter to be above Wall Street predictions of between zero and 10 cents per share.

"Apple bottomed out several months if not several years ago," said former Apple employee Trip Hawkins, who now heads up Electronic Arts, a software company in San Mateo, Calif. "It is now in the process of rebuilding."

That rebuilding began more than a year ago, after Jobs brought in Sculley. The company laid off 1,200 employees this year, merged its Apple II and Macintosh divisions and announced plans to close its Apple II manufacturing plant in Dallas.

Even with the ongoing restructuring and the Jobs exodus, "I don't think things will change drastically," Hawkins said.

But, critics said, Apple must begin taking some steps to ensure its position within the business market. John Girton, an analyst with Birr, Wilson & Co. in San Francisco, said Apple "should try to put the full [AT&T] Unix System V on the Mac and make it a Unix workstation. They have to show that [the Mac] is a good workstation that can communicate with the mini and the mainframe world."

Even with the affair of the past few weeks, "The overall mood at Apple is one of relief," said an Apple employee, who asked not to be identified. Employees were not suprised by Jobs' actions or the company's legal response, he said. "Everybody felt Steve Jobs wasn't going to tuck his tail between his legs. He's kind of used to getting his way."

*Contributing to this report were* Computerworld *West Coast correspondent Peggy Watt and Peter Tegelberg, a contributor to* Computer Sweden, *a Stockholm-based publication affiliated with* Computerworld.

# NCR adds dyadic 32-bit supermini

PARIS — Moving into the European market first, with plans for an announcement in the U.S. in October, NCR Corp. has introduced a high-end system for its NCR 9000 line of superminicomputers.

The 32-bit NCR 9500 was designed as a tightly coupled dyadic processor with a single memory of up to 16M bytes. It supports 24 to 100 users.

The company said that the 9500 is the first member of the 9000 family to feature a dyadic processor and the first to use 256K-bit memory chips. The earlier 9000 series processors, the 9300 and 9400, use 64K-bit chips but can be upgraded to the 9500.

Comparing the 9500 with other large NCR systems, a company official said the 9500 performs 1.1 million instructions per second (Mips) while the 9300 offers 0.37 Mips and the 9400 0.67 Mips. He also noted that the 9500 runs under a multiprogramming, dyadic processor version of NCR's ITX/DP. The 9300 and 9400, which like the 9500 are oriented toward interactive applications, run ITX, while NCR's 8500 family of mainframes runs NCR VRX.

The company said ITX/DP appears as one operating system to the user and the native Cobol compiler in the operating system gives the 9500 twice the performance of the 9400. ITX and ITX/DP are said to feature Virtual Look Ahead, a virtual memory access function.

An entry-level system is said to include 2M bytes of memory, a 45M-byte streaming tape drive, a 405M-byte fixed disk drive, 24 communications lines, a 600 line/min. printer and the operating system for $162,000. The system is scheduled for delivery in April 1986.

With NCR's Link Level Communication Subsystem, the system supports communications protocols such as X.25, IBM Systems Network Architecture and 2780/3780 Remote Batch System and provides distributed data processing capabilities.

# Walker Interactive shuts branch offices

SAN FRANCISCO — Walker Interactive Products, Inc. last week pulled in its horns with a consolidation that centers all of its operations at its home base.

The company issued a terse statement acknowledging a consolidation and declaring its intent to continue to provide service and support. Attempts to contact the company for further details were unsuccessful.

But one Walker customer said he had been informed that the company closed its four regional offices, effective last Monday.

Brad Blackburn, manager of computer services at Sunflower Electric Cooperative, Inc. in Hayes, Kan., said a Walker marketing representative informed him early last week that on Monday "officers of the company were at each of the regional offices closing all three regional offices effective immediately. Everything will be handled out of the San Francisco office." He later received a second call from a company official in San Francisco confirming the consolidation.

Last week *Computerworld* reported Walker has been offered for sale and that several of its leading competitors are bidding for the financially strapped company.

Blackburn said he was told that a sale of the company is no longer expected and that Walker has attempted to cut back expenses so it will be self-supporting and not require further infusions of venture capital.

## NEWS SUMMARY

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## CORRECTIONS

A chart that ran with the Network Management product spotlight [CW, Aug. 12] should have listed the number of circuits that are supported by Codex Corp.'s DNCS as 124.

■

The Hardware Roundup section dealing with mainframe systems [CW, Aug. 19] included incorrect information about Sperry Corp. products.

The Sperry 1100/70 H2 was incorrectly labeled as the 11/70 H2. The quoted lease prices for the System 11UP and the System 11MP are for three-year lease terms. The correct price per 1M byte for the company's System 80 Model 4 and the System 80 Model 6 is $20,956. The disk cache memories for the various systems should be listed as 4M to 64M bytes.

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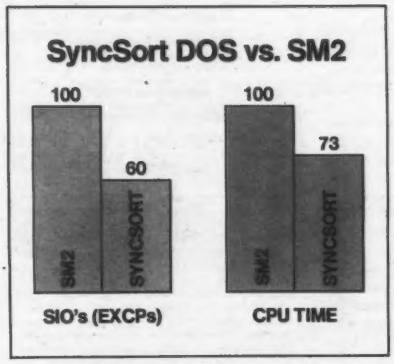


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# DOD discloses Soviet effort to acquire U.S. technology

## Soviet Ryad computers said to model IBM 370

**By Mitch Betts**

WASHINGTON, D.C. — The Soviet Union has carried on a massive campaign for the past decade to acquire U.S. computer technology, according to a U.S. Department of Defense report released recently.

Turning up the heat in its own campaign against Soviet bloc technology acquisition, the Defense Department revealed that the Soviet Union used IBM's 360 and 370 architectures as the basis for its Ryad series of computers. Pentagon officials would not disclose exactly how the Soviets copied the IBM mainframes. Generally, the Soviets obtain technical documents or hardware or both, Pentagon spokesman Cmdr. Bob Prucha told *Computerworld* last week.

At a Sept. 18 briefing, Secretary of Defense Caspar W. Weinberger described the Soviet campaign as being a "far more serious problem than we had previously realized." According to the Defense Department report, which is based on new declassified intelligence reports, the Soviets also targeted U.S. semiconductor, communications and fiber-optic and military computer technology.

"By their own estimate, more than 5,000 Soviet military research projects each year are benefiting significantly" from technology acquired from the U.S. and its allies, Weinberger said.

Illustrating the Soviets' strong interest in the 370, Weinberger's report said that in the mid-1970s, the Soviet ministry responsible for producing mainframe c nputers specifically asked the Soviet secret police and intelligence agency, the KGB, to obtain technical documentation on the IBM 370 Models 145, 158 and 168 and operating system data.

The KGB was asked to get documents dated 1974 or later from IBM in the U.S. and to obtain information about new IBM projects, the report said. By 1974, IBM's 370 architecture had virtual storage and the Systems Network Architecture. However, Prucha said the document request was not directly linked to the copying of the IBM 370.

Officials could provide no additional information about the Soviets' Ryad computers, except that the KGB also acquired Western technology for disk memory systems that improved the "military Ryad series disk drives."

The report, which is part of a Reagan administration campaign to restrict high-technology exports and to cut the number of Soviet bloc spies in the U.S., was written by the 22-agency Technology Transfer Intelligence Committee.

The Soviet campaign has enabled that nation to acquire computer disk memory systems, fiber-optic systems, bubble-memory technology, computer-controlled integrated circuit testers and a complete set of manufacturing equipment for printed-circuit boards. The report said the technology was used for military purposes.

The Soviets have selected major defense contractors as targets of the acquisition program, as well as high-tech universities such as MIT in Cambridge, Mass., and Carnegie-Mellon University in Pittsburgh; electronic data bases; and scientific conferences, according to the report.

The report specifically cited the U.S. Department of Commerce's online data base of government research abstracts and the Conference on Integrated Optics, which reportedly helped the Soviets to improve their fiber-optic communications devices.

Furthermore, the report said, Soviet collectors have easily obtained U.S. and Japanese integrated circuits, which can be copied through reverse engineering. Evidence showed that the Soviets' KR580IK80A microprocessor is a modified version of Intel Corp.'s 8080A 8-bit microprocessor.

The report predicted that the Soviets will increase their attempts to gain access to on-line data bases directly from the Soviet Union. One countermeasure would be to prevent sensitive research from appearing in public data bases — but that may inhibit U.S. research efforts as well, the report noted.

# Encore exec splits from Fisher's trio

**By James Connolly**

MARLBORO, Mass. — A high-level shake-up hit Encore Computer Corp. last week, only two weeks after the tardy formal introduction of the company's first superminicomputer multiprocessor.

One of the three founders of the young company resigned last Wednesday, while a second founder was having discussions "concerning the nature of his relations with the company," according to a brief press release issued by the seven-member board of directors.

The board cited differences in operating styles when it said that it accepted the resignation of Henry Burkhardt III, a director and senior vice-president for finance and operations.

C. Gordon Bell, a director and vice-chairman for technology, was the second founder reported to be engaged in discussions about his future with the firm.

Encore's vice-president for corporate affairs, Charles T. Casale, said that a determination of Bell's status might be made within days. In a published interview, company Chairman and Chief Executive Officer Kenneth G. Fisher said he believed Bell would remain with the company in some capacity.

"Some people may interpret this as negative. Henry [Burkhardt] made a tremendous number of contributions to the company. Bell, likewise, has made a number of valuable contributions, although his are of a less direct nature," Casale said. He said the differences of opinion between Fisher and Burkhardt involved management of the two-year-old company and that resulting changes would be unnoticed by outsiders.

Neither Bell, who, the company said, was traveling on the West Coast, nor Burkhardt could be reached for comment.

Fisher, the third founder listed in a prospectus issued when Encore made a public stock offering in April, will assume Burkhardt's duties on a temporary basis.

Prior to the time that the three united to form Encore in 1983, Fisher was chief executive officer and president of Prime Computer, Inc.; Bell was vice-president for engineering at Digital Equipment Corp.; and Burkhardt was cofounder of Data General Corp.

On Sept. 10, the company announced its Multimax superminicomputer and several related communications and workstation products. The Multimax is scheduled for October deliveries, Casale said.

Unveiled later than originally planned, the future of Multimax was clouded somewhat several weeks ago when Sperry Corp. pulled out of a deal to buy much of the company's output.

Casale said Burkhardt also is resigning his directorship and that a replacement may be named within weeks. He said Burkhardt retains his approximately 10% interest in the company.

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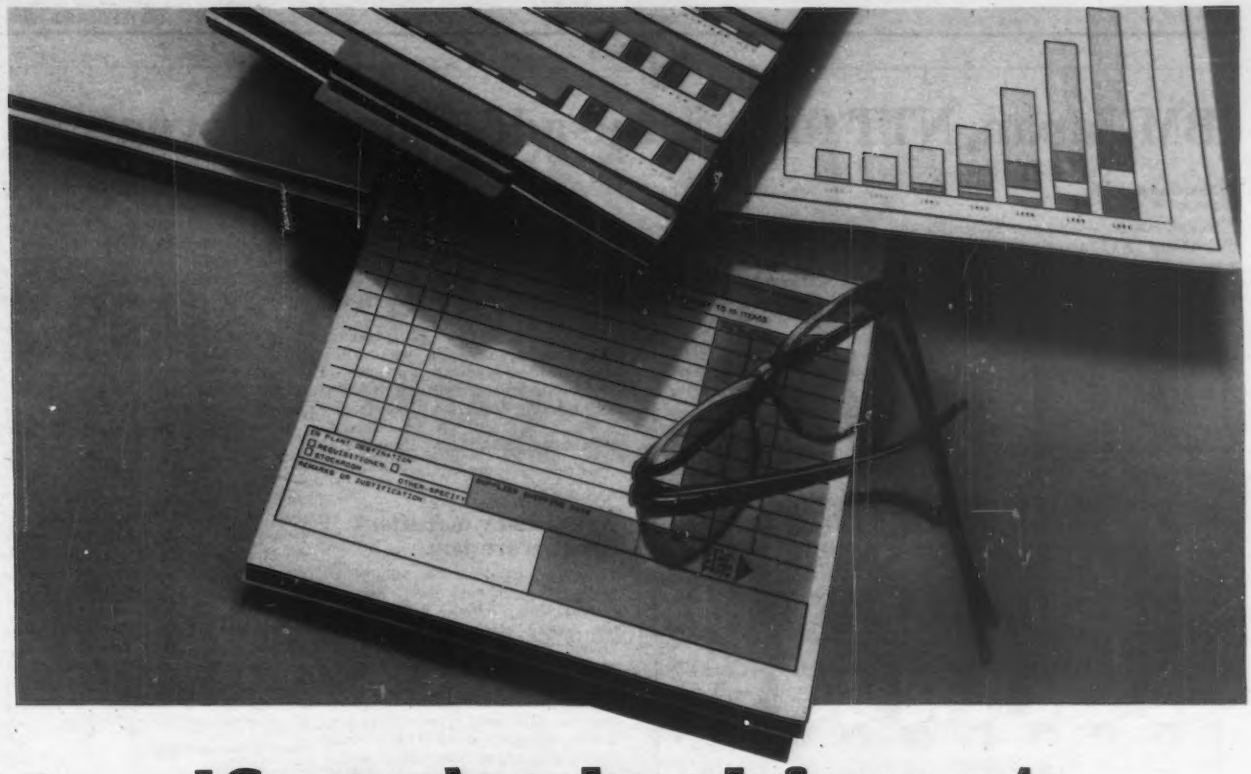

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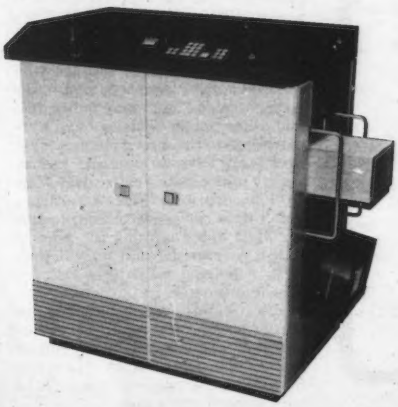

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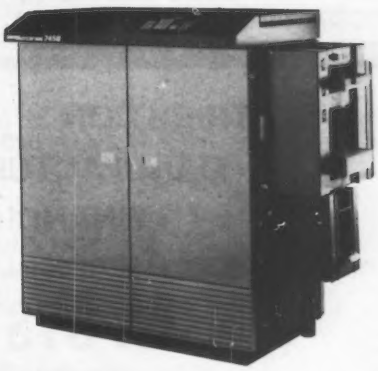

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# IBM Japan, NTT form value-added network venture

By Takehisa Kondoh
Special to CW

Tokyo (CWN) — Nippon Telegraph and Telephone Corp. (NTT) announced last week that it has reached a basic agreement to establish a data communications joint venture with IBM Japan Ltd. The new firm, to be financed equally by the two companies, will go into service later this year.

The venture, with an estimated initial budget of $2.6 million, will provide integrated data communications services by linking up IBM's Information Network with NTT's value-added network.

The pact may carry the brewing confrontation between AT&T and IBM to Japan. In July, AT&T formed a venture with a consortium of more than 200 Japanese companies to establish a value-added network.

The new firm, the details of which remain unknown, also will provide Japanese users with separate access to the Information Network, an NTT official said. For the planned service, the agreement requires that IBM Japan provide software and hardware resources to the physical network maintained by NTT.

Meanwhile, NTT, which went private in April under new telecommunications business laws, apparently will offer peripheral data communications know-how and be responsible for the development of user software.

Architectural differences between IBM's Information Network and NTT's value-added network have blocked interconnection of the two networks. This prohibited NTT from taking orders for its computerized value-added network systems from existing Japanese users of IBM equipment, because NTT, as the country's largest value-added network operator, has made exclusive use of Japanese-built computers for its network.

An industry analyst said that the latest agreement will benefit IBM, which is pursuing expanded presence of networked data communications in the Japanese market and also is stepping up efforts to boost sales of computer hardware to NTT.

*Kondoh is international editor/Asia for CW Network.*

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From page 1

## New Jersey motorists in software jam

capable of handling the volume of work generated each day," Department of Motor Vehicles Acting Director Robert Kline said last week. "Even working overtime and on weekends, the system is not keeping up," he said.

State administrators and spokesmen for ADR both claimed that the system designer used ADR's Ideal fourth-generation language in ways it was never intended to be used, and they questioned Price Waterhouse's reliance on Ideal before the new system was installed. "We found ourselves in the unusual situation of our advice not being followed on our product," said Joseph W. Farrelly, vice-president for research and development at ADR.

A spokesman for Price Waterhouse said last week that the accounting consulting firm has agreed to redo the system and will have further comment. "Frankly, we don't want to get into all the details. We don't feel that would serve any useful purpose," said Kenneth Doyle, director of communications at Price Waterhouse headquarters in New York.

At a hearing in Trenton Tuesday, the attorney general's office aired March 1984 correspondence from Price Waterhouse justifying the selection of Ideal on grounds of "productivity gains anticipated during the coding and testing phases."

"We've got pages and pages of things we feel are wrong with the system," said Bruce Jones, deputy administrator of the state Office of Telecommunications and Information Systems, which now oversees the state's computer operations.

**'Barn-burner application'**

"It was a barn-burner application, and I'm not sure Ideal was the right technology to use," Jones said.

Said ADR's Farrelly: "The batch sequential processing should have been written in Cobol."

Farrelly said it takes the same number of lines of code in Ideal to accomplish batch processing as in Cobol and that there was no inherent advantage in using Ideal in such a way. He said the 20% of subsystems that required heavy processing should also have been written in Cobol rather than Ideal.

In a Dec. 10 *Computerworld* report on large-scale applications development systems, ADR said Ideal is a "functional replacement for Cobol" and was recommended for developing large-scale transaction-oriented applications. "There is virtually nothing you can develop in Cobol that you cannot also develop with Ideal," the firm said at that time.

Farrelly said last week the company stands by the Dec. 10 statement "for most applications." However, he added, "In ADR's opinion, the [DMV] has special processing requirements, and ADR recommended that portions of them be put in Cobol and the rest in Ideal."

Jones said the state also ran into problems with the way Price Waterhouse interfaced Ideal with IBM's CICS.

Department of Motor Vehicle spokesmen have acknowledged that renewal notices have been sent to the wrong drivers, and many police cars and other public vehicles have been registered to the wrong municipality, prompting some to question the integrity of the state's entire data base.

"I'm surprised Price Waterhouse didn't do a better job of benchmarking Ideal and analyzing the kind of code it generated," said Mary Heminway, managing editor for Datapro Research Corp.

Price Waterhouse did a computer master plan for the department prior to being assigned the $6.5 million system redesign contract. The selection was made without competitive bids, state officials said.

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To attend the next free, half-day seminar in your area or receive additional information, write Oracle Corp., Dept. C4, 2710 Sand Hill Rd., Menlo Park, CA 94025, or call 415/854-7350. Following is the ORACLE seminar schedule:

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| | | |
|---|---|---|
| Albuquerque ..... Nov 26 | Los Angeles ..... Oct 22, Nov 19 | St. Louis ..... Nov 14 |
| Austin ..... Oct 3 | Minneapolis ..... Oct 10 | Salt Lake City ..... Nov 14 |
| Boston ..... Oct 15, Nov 12, Dec 11 | New Orleans ..... Nov 19 | San Antonio ..... Oct 23 |
| Chicago ..... Oct 16, Dec 12 | New York City ..... Oct 10, 25, Nov 6, Dec 12 | San Diego ..... Nov 7 |
| Cleveland ..... Nov 5 | Newport Beach ..... Oct 17 | San Francisco ..... Nov 5 |
| Columbus ..... Oct 8 | Oklahoma City ..... Nov 7 | San Jose ..... Oct 24 |
| Dallas ..... Oct 8, Nov 13 | Omaha ..... Oct 24 | Seattle ..... Oct 2, Nov 26 |
| Dayton ..... Oct 9 | Orlando ..... Oct 15 | Syracuse ..... Nov 7 |
| Denver ..... Oct 29, Nov 20 | Phoenix ..... Oct 9 | Tulsa ..... Oct 29 |
| Detroit ..... Oct 22, Nov 12 | Portland ..... Oct 10 | Washington ..... Oct 10,24, Nov 7, Dec 10 |
| Houston ..... Oct 31, Nov 21 | Rochester ..... Oct 10, Dec 5 | Wichita ..... Oct 3 |
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From page 1

## Relational Technology unveils Ingres for VM

vendor computing environments make better use of their existing hardware resources. According to Livingston, data base applications written in Ingres' fourth-generation language can run on all systems that support Ingres, including DEC VAXs and microcomputers that run Unix.

**Beta site lauds portability**

A spokesman for one beta site user of Ingres/CMS — the Federal Systems Group Information Services division of Nashua, N.H.-based Sanders Associates, Inc. — lauded that application's portability and said his organization intends to use the product in the future to bridge diverse machine environments.

Relational Technology's Livingston noted that Ingres/CMS provides an active data dictionary, a fourth-generation language, a query facility, implementations of IBM's SQL and Quel languages, a report writer, a facility with which to embed SQL or Quel statements within Ingres-developed applications and a screen painter. An optional graphics module is not yet available with Ingres/CMS, which is scheduled for production shipments in mid-October.

In addition, Ingres/CMS users will in the near future be able to use the Ingres/PCLink to browse Ingres data bases on the host and transfer data from a data base into popular micro packages, such as Lotus Development Corp.'s 1-2-3 and Microsoft Corp.'s Multiplan, with automatic data reformatting.

The relational DBMS is also said to use VM performance facilities such as block mode I/O and the Inter-User Communications Vehicle for Dasd I/O. Data from CMS files and OS sequential data sets can be transformed for Ingres/CMS data bases, the vendor said.

> *'Ingres saves us from the headaches of [IBM's] IMS and a hierarchical data base structure.'*
>
> — Dan Callahan
> Sanders Associates, Inc.

According to Dan Callahan, principal software engineer at Sanders Associates, the beta version of Ingres/CMS was installed in late May on an IBM 3083 running VM and MVS concurrently. Sanders was using Ingres on four VAXs, and Callahan said the company's recent porting of VAX-based Ingres applications and data bases to VM was something of a tedious chore but one that went smoothly.

**Performed migration**

Callahan said a Sanders team performed that migration by transferring files from a VAX to the IBM mainframe via DEC's Systems Network Architecture Gateway. The company plans to put Ingres/CMS and the systems developed for use with it during beta testing into production use in October. Both the VAX and VM versions of Ingres were selected, he said, because Sanders' engineering group was looking for productivity tools for both end users and programmers.

"Manufacturing and engineering systems really lend themselves to a relational system," Callahan said. "Ingres saves us from the headaches of [IBM's] IMS and a hierarchical data base structure. The major goal we have for Ingres is bridging the gap between machines so users do not have to worry where data resides."

Initial licenses cost $90,000 for Ingres/CMS for VM/CMS and $60,000 for VM/Entry. The Ingres/PCLink for Ingres/CMS will be available 90 days after production release of the VM version and will have an initial license fee of $12,000.

From page 1

## HP introduces IBM AT clone

nounced last week. The products were designed to tie into the company's Personal Productivity Center distributed processing concept.

According to Srinivas Sukumar, a program manager with HP's Personal Office Computer Division in Sunnyvale, the Office Share LAN conforms to the IEEE 802.3 communications standard and is compatible with Microsoft Corp.'s MS-Net software. The local networking product also enables work group members to use their micros to gain access to HP 3000 departmental processors, Sukumar said.

In an interview with *Computerworld* in New York, HP President John Young said the Vectra was not designed as a stand-alone competitor to the AT. "I wouldn't say we were set up as a company to do battle in the loose iron business; that's not what we're focused on at all." Vectra, and accompanying software, was designed as an upgrade path to the Personal Productivity Center office automation network concept, he said.

Vectra, like HP's existing Touchscreen personal computers, supports a version of Microsoft Corp.'s MS-DOS but is the first HP machine that can run off-the-shelf IBM PC-DOS applications without modification. HP is not offering a version of Microsoft's Xenix operating system as IBM is doing with the AT.

Unlike the Personal Computer AT, which incorporates a 6-MHz 80286, Vectra is built around an 8-MHz version of the 16-bit microprocessor, providing a 30% performance edge, Sukumar said.

Vectra is currently available in a choice of three models — the System 25, 35 and 45. An entry-level System 25 starts with 256K bytes of main memory and a 360K-byte floppy disk unit, while a System 45 can hold up to 3.64M bytes of central storage and a 40M-byte hard-disk module; the 40M-byte hard disk will not be available until early 1986.

A minimum System 25 configuration and a full-blown System 45 cost 20% less than and 60% less than, respectively, their IBM Personal Computer AT equivalents, Sukumar said. The Vectra Systems 25, 35 and 45 start at $3,199, $3,399 and $3,599, respectively.

When bundled with Advance Write in two configurations, with or without hard disk, the AT-compatible micro becomes a Vectra Office Workstation. Advance Write, jointly developed with Samna Corp., is available in three versions.

Advance Write supports IBM's Document Content Architecture and thus can coexist with industry-standard applications like Multimate Corp.'s Multimate and the IBM Displaywriter. Documents produced with Advance Write can be distributed to HP or IBM micros and then read but not revised under Multimate and Displaywriter, Sukumar said.

With the existing HP Access product, meanwhile, the word processing package can download data from an HP 3000, merge the material with a microcomputer-resident document and then return the information to its origin, he said.

The word processing software forms part of HP's Advance Net communications architecture, which allows different processor models to exchange files and programs across an entire organization.

Similarly, Office Share also fits within the Personal Productivity Center concept by permitting Vectras, HP Touchscreens and IBM micros to be networked locally. Also announced was HP Advance Link 2392 software, said to allow Vectra PCs and IBM Personal Computers to emulate the HP 2392 terminal and to communicate with the HP 3000 system through Office Share.

Advance Write versions are priced from $295 to $695; an Office Share starter kit for the Vectra PC costs roughly $2,300 for hardware and software. Prices start at $5,229 for the Vectra Office workstations. Advance Link 2392 is priced at $295.

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# HP staffing moves, Apollo results show slump lingers

By Clinton Wilder

Adverse news from Hewlett-Packard Co. and Apollo Computer, Inc. last week did not bode well for expectations that the computer industry is emerging from its 1985 slump.

Apollo, the Chelmsford, Mass., vendor of 32-bit engineering workstations, laid off 300 employees and predicted an $18 million fourth-quarter loss — its first ever. HP extended its previously announced furlough program for U.S. employees.

Meanwhile, the U.S. Department of Commerce announced that July orders for office and computer equipment fell 11.3%, seasonally adjusted, from their June level. Shipments decreased by 14.1% while inventories remained flat.

"Things are still pretty sluggish; we are by no means out of the woods yet," said a spokesman for Apollo. The company projected an after-tax operating loss of $4 million and a one-time charge of $14 million as a result of the layoffs.

Apollo attributed the sluggish sales to cancellation and deferral of orders by engineering system OEMs, which make up the bulk of Apollo's market.

Sandra Gant, an industry analyst with Infocorp in Cupertino, Calif., said the slightly improved U.S. economic climate and weakened dollar have not sparked computer sales.

"There's been a lot of talk and hype from the vendors about networking and other pitches to the end user, but very few real solutions have been delivered," Gant said. "The major users decided to spend 1985 just thinking. It appears that they still are."

An additional squeeze on minicomputer profits, according to Gant, is the trend toward lower priced products such as the Digital Equipment Corp. Microvax II. "The Microvax II is selling, but you have to sell a lot of them to bring in a lot of dollars," she said.

In Palo Alto, Calif., HP announced that all non-sales offices in the U.S. will close for the entire weeks of the Thanksgiving and Christmas holidays, giving 45,000 employees a total of four unpaid vacation days. Employees will be required to take one paid vacation day in each week, in addition to the paid holidays of Nov. 28-29 and Dec. 24-25.

The announcement continued HP's ongoing plan of furloughs that was begun last July and is expected to continue at least through the end of January 1986.

"Our business picture remains about the same as it has been," said Dean O. Morton, HP's executive vice-president and chief operating officer, in a statement. "Overall business levels do not support the expense of a full work schedule."

The company also announced its worldwide hiring would be scaled back to a minimum, effective immediately.

# Borland OKs site licensing

By Eric Bender

SCOTTS VALLEY, Calif. — Bowing to "a tremendous amount of requests from corporations," Borland International, Inc. last week unveiled site licensing options for its Sidekick and Superkey microcomputer packages, according to Sales Vice-President Spencer Leyton.

Under the new program, companies can purchase a Sidekick or a Superkey master disk and make up to 2,000 copies for $25,000 or an unlimited number of copies for $50,000. Alternatively, they can license the two products together at a price of $35,000 for up to 2,000 copies and $70,000 for unlimited quantities.

It is difficult to specify the effective discounts because of uncertainty about the number of users, Leyton pointed out.

**No specialized support arrangements**

Primary software upgrades, such as from Version 1 to 2, will be available for 30% of the site license fee, with secondary upgrades, such as from Version 1 to 1.5, costing 10% of that fee. Borland said it does not intend to offer specialized support arrangements beyond designating a specific technical person for the site license customer, Leyton said.

Companies that sign an up-to-2,000-copy agreement will be provided with 1,000 manuals, with additional copies priced at $5 each. Firms that buy unlimited licenses will probably receive 2,000 manuals.

Arthur Andersen & Co., a Big Eight accounting firm headquartered in Chicago, is one of the first Borland site licensees, signing an agreement for Sidekick, the best-selling desktop manager program.

Sunil Subbakrishna, a manager in computer aids for tax preparation at Arthur Andersen said the company has roughly 3,700 personal computers worldwide, and "we have the trouble of trying to keep track of where every program might go."

Site licenses offer the promise of reducing administrative overhead and help lead the way toward standardization, Subbakrishna said.


## How $20 worth of system-development ideas can save you a bundle on programming and maintenance

The methods you use to analyze, design, and implement new systems can have a tremendous effect on programming and maintenance time in your shop.

For example, suppose a new system is already being programmed when you find you need a few more fields in a record...or you need another file. At the least, you have to recompile the finished programs with the new record formats. And you may be in for weeks or months of re-programming. That means productivity goes down and probably so does program reliability (you just can't revise a program as well as you write it in the first place). That, in turn, means future maintenance problems. All because of faulty file/database design.

Or suppose the system documentation is so long and complex that (1) it was never finished, (2) no one keeps it up-to-date, and (3) no one bothers using it because they can never find anything in it. Then, when a change has to be made, the maintenance programmer has a tough time correcting...or even pinpointing...all the affected programs. And it's likely that one change will lead to a new problem somewhere else. All because of bad systems methods, not bad programming.

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If you cut problems like these to a minimum, you'll improve program development in your shop and save maintenance time and dollars. And you *can* cut down on these problems if you use the system-development ideas presented in a $20 book called *How to Design and Develop Business Systems*.

I know because we used these ideas to develop our inhouse system 2 years ago. Now, one person maintains about 600,000 lines of COBOL code in less than 2 days per month. And most of the maintenance would more properly be called program enhancement. As you can imagine, that frees up plenty of time for new program development, so we don't have a months-long backlog.

I'm convinced *How to Design and Develop Business Systems* will help you, too. Here's just some of what you'll learn in this practical book:

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- how to use a *model DFD* to logically design a new system in a fraction of the time you need using your current design methods
- why users can easily understand DFDs and point out mistakes in them...so you can correct problems long before programming starts
- how to use your model DFD to figure out what data elements you need in the new system
- how to use your model DFD to create a *system structure chart* that breaks the system down into logical functions
- how to use your system structure chart as an index to the system (each box on the chart is a program in the system, a menu in an interactive system, or a procedure)
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From page 1

## Whiz kid, 22, runs Longman Group

for another job. As he was examining the "help wanted" section of the local newspaper, Stith noticed Longman Group's advertisement for a manager of computer operations.

In an effort to expand its business, Longman Group had begun acquiring companies with annual revenues of approximately $10 million. In conjunction with the changes, the company devised a three-year plan for integrating its subsidiaries' DP departments. The company needed someone to oversee hardware conversion.

Stith was very interested in becoming that someone. "I almost did not apply for the job because I was afraid I would not get it," he said.

Competition for the position was fierce, and Timothy Honaker, director of information resources at Longman Group, reported that there were at least three candidates suited for the job.

Stith's age and relative inexperience were deemed more of a benefit than a disadvantage. "Since he hadn't been working very long, he was not locked into a set pattern of doing things, which was important since we do not run a typical DP department," Honaker noted.

In September 1984, Stith joined Longman. Subsidiaries had worked with various brands of hardware, including NCR Corp. and Qantel Corp. systems. As manager of computer operations, Stith has overseen migration from that equipment to DEC VAX series superminis.

The position has had its challenges. "I don't get home as early as I should, and there are times when I am on the road longer than I planned," Stith related.

Honaker has been satisfied with Stith's performance but said that there are areas for improvement. "Since he is so young, he has been taken advantage of," the director of information resources noted. Stith has trouble saying no to people, according to Honaker. Rather than concentrating on one item and seeing it through to completion, he tends to juggle a number of unfinished projects. Honaker said that this problem could be solved as Stith gains more experience.

As he gains more experience, other positions will become available to him. Eventually, Stith would like to move more into a management position and away from the day-to-day operations.

"I am gaining a lot of experience with items such as negotiating contracts with vendors," he noted. "That experience may become very beneficial to me later."

■

## Firm realizing decentralization

CHICAGO — Decentralized data processing has been a pipe dream for many corporations. Longman Group U.S.A., Inc., primarily a publishing company, is realizing that dream with a distributed operation that connects six offices in four states.

Two years ago, Longman's parent company, Longman Group Ltd. in London, decided to increase its presence in the U.S. through a series of acquisitions. The purchases added company offices in New York; Washington, D.C.; Chicago; Naperville, Ill.; and Vernon, Conn.

With each acquisition came a computer system. Rather than supporting a number of different systems, the company decided to choose one standard piece of hardware. After examining a number of offerings, Longman decided to install Digital Equipment Corp. VAX superminicomputers in each office.

Timothy Honaker, director of information resources at Longman, listed two reasons for the choice: DEC's product line had software that could be run on large and small systems, and the VAX systems cost less than comparable Wang Laboratories, Inc. and IBM offerings.

Currently, at each location the VAX systems run payroll and general ledger applications written by Xenthom Corp., a Chicago consulting firm.

With the software and hardware chosen, Longman has embarked on a three-step plan to implement a distributed system. Converting the current payroll and general ledger applications to the DEC systems is the responsibility of Honaker's department, which consists of Honaker, a computer operations manager and a business analyst.

What makes the system truly distributed is that after the conversion, Honaker's group supplies only routine troubleshooting. Running the systems becomes the subsidiary's responsibility. If a subsidiary wants to alter its applications, it pays the consulting firm.

At most companies, a maintenance programming staff would make the changes. "We don't have any maintenance programmers today, and I don't think we will have any in the future," Honaker said.

The director of information resources said there are benefits to not supplying maintenance programmers. Because a subsidiary has to pay for changes, it is less likely to request minor, unnecessary changes.

Another benefit is that the consulting firm has experienced programmers. "We would not be able to afford the consultants on a full-time basis," Honaker noted.

In the next few years, Honaker's group will have more work. Longman said it plans to continue to add other companies to its fold.

The third step in the plan will link the subsidiaries in a synchronous network. Despite the increased work load, Honaker said he thinks that the staff will remain relatively small. "We want to work as company consultants and distribute data processing functions to the subsidiaries," he said.

When the third step has been completed, the dream of distributed data processing may be realized.

— Paul Korzeniowski

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The deadline for submissions has been extended to Oct. 4. Articles must be typed, double-spaced and range from three to five pages. Artwork is welcome.

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# Data flows despite earthquakes

## Firms trade info by tape, courier

By James Martin

With the help of magnetic tape and courier services, U.S. corporations with DP operations in Mexico City have been able to continue trading information in the wake of two recent devastating earthquakes.

Although the quakes have been called the worst thing to happen since Hernan Cortes destroyed the ancient city in 1521, many industrial plants and offices were left practically unscathed. Two U.S. companies with Mexican operations said last week that subsidiaries south of the border suffered little damage.

But most communications links were down following the first quake, with reports that the situation will not return to normal for months. This has caused MIS and DP managers to find new ways for the home office to communicate with the Mexico City subsidiaries.

Hewlett-Packard Co.'s four offices in Mexico City received little structural damage, with computer systems continuing to operate after an initial power outage caused by the first quake, according to Sy Corenson, public relations manager for the Palo Alto, Calif.-based firm's intercontinental operations.

### Two facilities unaffected

HP's two manufacturing facilities in Guadalajara, Mexico, were unaffected by the quake, Corenson said, and are now serving as communications links between Mexico and California. Users of the HP 3000 in Mexico City can store data and electronic mail on magnetic tape, which is then flown by commercial airline to Guadalajara and from there transmitted to California.

> *Most communications links were down following the first quake, with reports that the situation will not return to normal for months.*

Graphics and other hard-copy documents can be transmitted to Guadalajara via facsimile apparatus and flown to Mexico City.

E. I. du Pont de Nemours & Co. in Wilmington, Del., has continued to interface with the HP 3000 system in the corporate headquarters for its Mexican subsidiary by sending magnetic tape via overnight courier, according to Donald M. Breth, business analyst for Dupont in Wilmington.

Breth said Dupont's 14-story office tower in Mexico City was spared any major damages, and DP operations have remained in operation, although isolated. Financial data is stored on magnetic tape and mailed by overnight courier to Delaware, where it is batch processed into the headquarter's IBM mainframe environment.

Normally, Breth said, Mexico City and headquarters communicated electronically via Tymshare, Inc.'s Tymnet system and Telepac, Mexico's public net. But the Mexican link has been down since the quake and restoring the system could take months, he added.

Although this is not the ideal situation for communications, Breth said, the process of trading data has not been adversely slowed and business is still being conducted "pretty much as usual."

## TOP OF THE NEWS

Continued from page 1

**more on Jobs and Apple, see story on page 2 and editorial on page 16.**

■

**Storage Technology Corp., still in the reorganization** process under Chapter 11 bankruptcy protection, announced last Thursday it will deliver its 8380 Model E dual-capacity disk drive two quarters ahead of schedule. The Louisville, Colo.-based firm said the storage device will be available at the end of the second quarter in 1986, instead of in the fourth quarter of 1986.

■

**Amid the much-reported computer industry slump,** transaction processing systems sales are booming. Owing largely to intense activity with automated teller services and automated factories, the transaction processing market will grow from $7 million in sales for 1984 to an estimated $12 billion-plus in 1990. **For more on transaction processing growth, see page 85.**

■

**Representatives of 15 European leasing companies** met late last week to determine a course of action against IBM because of alleged discriminatory marketing practices. Spokesmen for the group, called Eclat, declined to discuss details of the allegations, but they are thought to center on IBM's policy on bulk purchase discounts. The discounts, also called volume purchase agreements, are offered primarily by IBM to its largest European leasing customers and are alleged to be unfair to small users. Eclat has threatened to report the U.S. computer company to the European Trade Commission and to the Bundeskartellamt, the West German Office of Fair Trading.

■

**Eagle Computer anticipates a busy fall season.** By the end of October, the Garden Grove, Calif.-based company will introduce an enhanced version of its Turbo microcomputer that will provide multiuser capability for up to eight users. And by the end of November, it will introduce a supermicro, currently code-named SST, that will accommodate from eight to 64 users. **For more on Eagle, see page 91.**

■

**Ex-Wang President John Cunningham has lured two of** the Lowell, Mass., company's ex-best and brightest to his new home at Computer Consoles, Inc. in Rochester, N.Y. CCI recently hired Harold Koplow and Dave Moros, two of the engineering wizards behind Wang's trademark word processing systems and its VS series minicomputers. Both Koplow and Moros had left Wang well before Cunningham's departure earlier this year, but the hires are nonetheless an impressive feather in CCI's cap.

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# Product said to tie varied units with single command set

By John Dix

QUINCY, Mass. — A product that enables micro, mini and mainframe computers to be tied together in a unified system with a single command set sounds like marketing hyperbole. But Command Technologies, Inc. claims its new architecture can do just that.

Command Technologies was cofounded in 1978 by Franco Vitaliano and Calvin Mooers to market products that melded Vitaliano's knowledge of neurology with inventions made by Mooers. Mooers' history in information processing dates back to 1945, when he worked at the U.S. Navy's labs with luminary John von Neumann on the development of a digital computer that preceded the Eniac computer built in 1946 at the University of Pennsylvania.

The first release of Command Technologies' Virtual Extended Machine (VXM) architecture, unveiled recently, includes hardware and software that enable systems based on AT&T's Unix, Microsoft Corp.'s MS-DOS and Xenix and Digital Research, Inc.'s CP/M operating systems to be interconnected. Vitaliano said in an interview with *Computerworld*. VXM handles file and transmission code conversions between these operating systems and provides the facility to create a common command set for all machines involved.

This is achieved by installing what Command Technologies calls software agents in the machines to be interconnected and creating an application to drive those agents using a hardware device called an Orchestrator. To date, Command Technologies only offers agents, which are written in C, for the Unix, MS/DOS, CP/M and Xenix operating systems.

### Rolling out agents in a week

Vitaliano claims his company can roll out operating system-specific agents in a week, given access to the type of processor targeted. Written in C, these agents can be installed in any processor that supports a C compiler. Once installed, the user can create the application that provides the desired functionality. This is done with the Orchestrator.

The Orchestrator is built on a Multibus and contains a single-board computer with an Intel Corp. 80286 chip to process applications and an Intel 80186 to handle communications. It also contains from 1M to 4M bytes of random-access memory (RAM) and has three serial ports, a parallel port and an Ethernet local network controller and port.

The Orchestrator is used to create applications that drive the agents. Applications are written in the company's VXM Notation, an interpretive language tht Vitaliano describes as a powerful string processor. Applications are said to be machine independent and capable of running on any processor with an agent.

Besides performing the necessary conversions that enable different types of processors to communicate, the Orchestrator can be used to create a single command set. A terminal user on a Hewlett-Packard Co. HP 3000, for example, would be able to invoke an application on an attached Digital Equipment Corp. Microvax using the same user interface to which he is accustomed.

DEC, in fact, is one company interested in VXM. The minicomputer manufacturer is automating its factories and is looking for a system that will support control systems from various manufacturers, each of which has a different operating system and command structure, according to Piotr Chadzynski, principal software engineer with DEC's internal plant automation efforts.

VXM may provide the solution. Chadzynski said it performed well in a demonstration but that he would like to evaluate it more closely.

The technology is "clearly feasible," according to Roger Needham, a professor of computer systems with Cambridge University, England, admitting that he has no idea of how well it has been put to use by Command Technologies. "It might be too big or too slow. If you're selling flexibility and portability, these things have their price in size and performance," Needham explained. "It's not until you get down to the nitty-gritty that you know whether the price is worth paying."

An Orchestrator diskless workstation with 1M byte of RAM costs $14,900 and $17,900 with 4M bytes. Fault-tolerant versions of the same device cost $25,900 and $28,000, respectively. A Unix software agent for mini or host computers costs $15,900. Micro agents cost $495 for MS/DOS, $275 for CP/M and $995 for Xenix and Unix System V.

Command Technologies intends to release hardware agents for microcomputers that will enhance VXM by providing content addressability. This capability is based on a process Mooers patented called superimposed random coding.

This random coding technique makes it possible to characterize the contents of a 400M-byte optical disk attached to a micro by building a file, as small as 4K bytes, that is kept on the micro hardware agent. In this way, a network search can be done by polling each descriptor file, eliminating the need to check a large central directory or interrogate each node, Vitaliano said.

The Cipher

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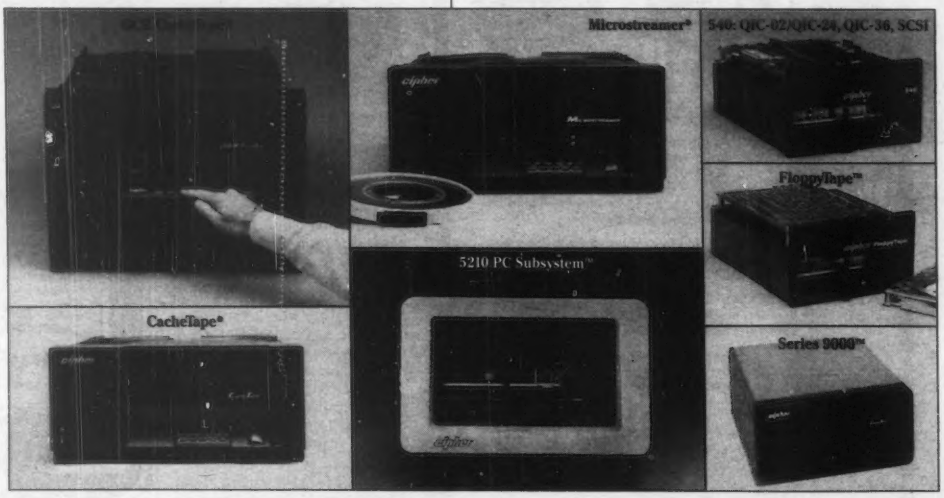


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# Electronic privacy bill receives bipartisan support

By Mitch Betts

WASHINGTON, D.C. — The Electronic Communications Privacy Act of 1985, introduced recently by Sen. Patrick J. Leahy (D-Vt.) and Rep. Robert W. Kastenmeier (D-Wis.), has picked up additional support from key Republican lawmakers.

The legislation (S. 1667 and H.R. 3378) would make it a federal crime to intercept electronic communications, such as data communications or electronic mail, or to tamper with the computers in a data network [CW, Aug. 12].

Cosponsoring the legislation are Sen. Charles Mathias Jr. (R-Md.) and Rep. Carlos J. Moorhead (R-Calif.) who are senior Republicans on the House and Senate judiciary committees.

Because of this bipartisan support as well as help enlisted from the American Civil Liberties Union, the Electronic Mail Association and other interested parties, Sen. Leahy predicted that the legislation will be enacted by the 99th Congress.

However, the Leahy-Kastenmeier bill also competes for Congress' attention with two computer crime bills, one proposed by the U.S. Department of Justice [CW, Sept. 23] and the other sponsored by Rep. William J. Hughes (D-N.J.) [CW, June 3].

The privacy bill and the computer crime legislation overlap in their coverage of data stored in private computers. But P. Michael Nugent, Washington, D.C., counsel for Electronic Data Systems Corp., said that although the bills approach the issue from different perspectives and may proceed separately, eventually they could be joined together.

Nugent, who is chairman of the privacy committee of the Association of Data Processing Service Organizations, said he participated in the drafting of the Leahy-Kastenmeier bill and considers it "a very positive bill."

Sponsors said the legislation is needed to give data communications the same privacy protection given to the U.S. mail and telegrams. "We cannot let any American feel less confident in putting information into an electronic mail network than [he] would in putting it in an envelope and dropping it off at the post office," Leahy said.

### Under federal statute

Under the federal wiretap statute, enacted in 1968, only voice communications are protected from interception. Mathias and Kastenmeier said that the lack of privacy protection may inhibit the growth of new information industries as well as erode privacy rights.

The bill would outlaw the interception of data and video communications on private networks and the unauthorized access of network computers if messages stored there are obtained or altered. It would be inconsistent to prohibit the interception of data transmissions and leave the data unprotected once it is stored in a network computer, sponsors said.

Under the bill, offenders could face penalties of up to $250,000 and one year in prison if the crime is committed for commercial gain or malicious reasons.

Also, law enforcement officials would have to get a court order to obtain electronic messages, and electronic mail services could not disclose the contents of messages without the authorization of the sender.

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# Japan to create research center

By Takehisa Kondoh
Special to CW

TOKYO (CWN) — The Japanese government has approved the establishment of the nonprofit Center for Promoting Research for Basic Technologies. The center, which will be run jointly by the Ministry of International Trade and Industry (Miti) and Posts and Telecommunications, will start operation on Oct. 1.

Miti said it hopes the center will become the core of the government's efforts to promote research and development and application technologies by private industries in microelectronics, new materials and bioengineering.

According to Miti, the new organization, chaired by Federation of Economic Organizations leader Yoshihiro Inayama, will finance and extend loans to related private projects and assist firms to make use of government-run labs.

*Kondoh is international editor/Asia for the CW Network.*

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# Multimate upgrading Advantage word processing tool

By Charles Babcock

NEW YORK — Multimate International Corp. told a group of its users last week that it is enhancing its Multimate Advantage microcomputer word processing package and will soon ship hardware options.

In addition, Multimate is continuing to work on mainframe word processing software and expects to introduce a $1,800 to $2,200 package for the IBM System/36 in the first quarter of 1986. It will offer word processing to run under IBM's VM and MVS operating systems for larger mainframes later in 1986, said Bob Obuch, senior vice-president for sales with the East Hartford, Conn.-based company.

Multimate spokesmen told about 30 New York-based large-account users that the acquisition of the firm by Ashton-Tate is still on track and is expected to be completed by the end of the year. Security Exchange Commission approval must be given before the boards of the respective companies can vote to complete the deal.

Once the acquisition is completed, Multimate will examine the possibility of making files from the Ashton-Tate data base management systems — Dbase II and Dbase III — compatible with Multimate's word processing files, Obuch said. Multimate and Ashton-Tate share many corporate users, he noted.

Multimate is enhancing its top-of-the-line Advantage software by adding a thesaurus with 40,000 entries, to which a user may refer without exiting a document. In addition, the $595 Advantage package will include an option to create up to nine columns on a screen, each defined by the user, Obuch said.

Registered users will be able to upgrade to the package beginning in December for $60 if they update within two years of becoming an Advantage user, according to the vendor. Users of Multimate Executive Release 3.3 or earlier versions may update to Advantage for $50, again provided they do so within two years of becoming a Multimate user.

The software firm is now selling a $295 keyboard that makes the IBM Personal Computer more closely resemble a Wang Laboratories, Inc. dedicated word processor, spokesmen noted.

In October, Multimate also will be selling a $995 communications board and software that is said to permit document exchange between IBM Personal Computers using Multimate and Wang Office Information System, VS and Alliance word processors.

The company also will offer in October a $159 Graphlink package that reportedly allows a user to clip an illustration or graph and store it as a Multimate file.

# IBM merging sales offices

By Clinton Wilder

ARMONK, N.Y. — IBM last week moved to trim its administrative costs by reorganizing its two main marketing divisions along regional lines, a move that will apparently have little effect on large customers.

Effective Jan. 1, Big Blue will eliminate its National Accounts and National Marketing divisions, replacing them with the White Plains, N.Y.-based North-Central Marketing Division and the Atlanta-based South-West Marketing Division. Sales offices will now differentiate customers by geographic locations, rather than by the size of the account.

"It's a ho-hum announcement, and our service won't change a whit because of it," said George DiNardo, senior vice-president of information management and research at Pittsburgh's Mellon Bank NA, a large IBM installation. "IBM is simply too smart an organization to do anything to change the way it handles national accounts. They will continue to serve us as they always have. It's been 15 years since I worried about an IBM reorganization."

DiNardo said the move could help IBM refocus its resources, which could have positive benefits for large users. "Combining their regional offices is long overdue," he said.

IBM officials said the move was a continuation of the company's major overhaul started in 1981, when it changed from a sales organization based on product lines to its current distinction between Fortune 100 accounts and smaller customers. That distinction still has created some overlap within regions.

The company's 25 current regional offices will be consolidated into 13, with six in the Northeast and northern Midwest and seven in the Southeast, Southwest and West Coast areas.

Frank Gens, an IBM analyst with International Data Corp., agreed with DiNardo that the change was overdue. "They have two offices in each region doing sales support and administration, one for national accounts and one for national marketing. Those will be consolidated into one."

A word for those who just bought a Unix system.

# Micropro offers net licensing, IBM conversion utility

## Reports rise in profits, revenue for quarter

**By Eric Bender**

SAN RAFAEL, Calif. — In a move demonstrating increased attention to corporate users, Micropro International Corp. last week joined the ranks of vendors offering local-area network licensing and IBM Document Content Architecture (DCA) conversion capabilities for microcomputer word processing software products.

The network license program, available immediately, supports the IBM PC Network, 3Com Corp. Ethernet series networks and Novell, Inc. Netware networks. It permits users who buy the standard Wordstar 2000 or Wordstar 2000 Plus packages to buy additional licenses at a lower price. A minimum of three licenses must be purchased, at a cost of $225 per workstation on nets with nine or fewer workstations and $195 per workstation for larger configurations.

Micropro President H. Glen Haney told *Computerworld* that it makes sense to offer pricing discounts for network software and said he expects that the new licensing scheme will reduce unauthorized copying of the package, which is not copy protected.

Micropro designed Wordstar 2000 to support basic network features such as resource sharing so a network-specific version is not required, said Bill Crowell, vice-president for development. The network license includes an installation guide for the selected network, and user documentation can be ordered at $30 for Wordstar 2000 and $35 for Wordstar 2000 Plus.

The DCA conversion utility, offered for all Micropro word processing packages, will aid users in transferring documents to and from IBM mainframes. "We've gotten a lot of feedback from corporate customers that they will require this capability," Crowell said.

Available by year end, the utility will provide bidirectional, revisable-form DCA capabilities. Pricing has not been set but will be less than $50, Haney said.

Unlike some of its competitors, Micropro has no intention of porting its word processing software to larger IBM systems, he added. For word processing, "the cost and performance of delivery on a personal computer are unbeatable," he maintained.

"Rather than develop products for large or mid-size mainframes, we are devoting our efforts to increasing functionality and interconnectivity," Haney declared. The network licensing, DCA product and forthcoming site licensing program "are all aimed at strengthening that," he said.

### Upturn in revenue, profits

Separately, Haney noted that following five quarters of declining revenue and losses, Micropro has had "two quarters of upturn in revenue and a return of profitability."

The firm last week reported profits of $1.2 million on revenue of $10.7 million for the fourth quarter, ended Aug. 31. In the same quarter last year Micropro lost $756,000 on sales of $12.4 million.

For the year just ended, the company posted a profit of $207,000 on revenue of $42.6 million, compared with a year-earlier profit of $5.7 million on revenue of $66.9 million.

Haney denied industry rumors that Micropro has been searching for a buyer, saying instead that the firm is examining opportunities to acquire other firms in related markets.

He acknowledged that the overall micro software market "has not yet regained its equilibrium of sustained growth" but predicted significant industry growth this year. However, Haney also forecast a shakeout among word processing software suppliers. "We've counted over 200 companies, which is clearly an outrageous number," he remarked.


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# VIEWPOINT

## EDITORIAL

# *What Jobs hath wrought*

When Steve Jobs and Steve Wozniak first holed up in a Silicon Valley garage in the mid-1970s to begin shuffling the components of what was to become the Apple microcomputer, they were launching an era that was to change the lives and work styles of computer professionals. A part of that era formally ended this month with Jobs' departure from Apple, and we would be remiss in not marking its passing.

The vision Jobs and Wozniak acted upon was one that foresaw computing power taken from the few and given to the many. The operative word here is *taken*. Theirs was not a gentle vision nor was its realization in corporate America a gentle process. Hundreds of corporations and thousands of careers had been snugly constructed upon the concept of centralized processing, and the notion of *personal* computing did not mesh well with this concept.

But Jobs and Wozniak had reaped a high-tech whirlwind. As with most great entrepreneurial success stories, Apple's growth was immeasurably aided by a confluence of factors far beyond the powers of its founders. In a 180-degree turn from the previous decade, the U.S. in the 1970s was becoming a business culture. Real estate, the saying went, was the marijuana of the '70s. Venture capitalists were the new American heroes. Business schools were standing room only, and *The Wall Street Journal* added a second section.

The phenomenon was fed by goal-oriented young tyros who quickly perceived the value of the personal computer in tapping data and data processing power previously accessible to only a select few. The Apple II gave them a competitive edge — a big competitive edge — and a machine originally thought to have modest potential in the home and education markets was suddenly an enormous hit among business customers. By the time the rest of the computer industry caught up, Apple was a Fortune 500 company, and Jobs and Wozniak were legends.

One problem with entrepreneurial legends is that they frequently do not fit in well with the day-to-day reality of corporate management. Here, Jobs was Exhibit 1A. Not only was Apple's internal management excessively cavalier and casual, but also externally Jobs failed to effect the kinds of external commercial liaisons with other market forces, specifically IBM, that would have broadened Apple's consumer base and product appeal. Other young computer entrepreneurs did do this, specifically William Gates of Microsoft Corp., and are prospering.

Regrettable though this turn of fate may be for Jobs, it should not dim the value and importance of the achievement to which he contributed: The redistribution of computing power sparked by the success of microcomputers, led by Apple, has changed the way that businesses gather and use their data.

## *Notes & observations*

IBM reorganized its largest marketing divisions last week so that now each field office will be able to sell a completely integrated IBM product line. Good. We're all in favor of integration. Come to think of it, we think it would be a nice idea if IBM now got about the business of integrating its operating system architectures.

## LETTERS TO THE EDITOR

### Cost overrated, flexibility overlooked in making presentation graphics choices

The article, "Graphics users prefer transparancies to slides" [CW, Aug. 19], rightly focused on the preference for overheads over 35mm slides but left the erroneous impression that cost was the major factor in this selection.

As a consultant involved in generating both proposal materials and training courseware, I generate as many as 1,000 individual presentation pieces in a given year. I use a personal computer for most of this and combine word processing, spreadsheets, graphics and a data base in my efforts.

The main reasons that I prefer overheads are that they give me a much better delivery environment, and they allow me the flexibility of assembling a presentation from existing materials quickly and efficiently because I have the masters for my overheads stored and indexed in the computer. Also, I can make quick changes after a client walk-through or pilot run.

Finally, the article, in focusing on the cost issue, makes the characteristic mistake of looking at initial cost only. If one totals the cost in compromising the quality of a presentation by use of a basically unfriendly medium, 35mm, and one takes advantage of the truly friendly personal computer-oriented tools now easily available, the decision to use overheads becomes not one of accounting costs but of measuring effective impact for each dollar spent.

**Donald N. Frank**
Florham Park, N.J.

### Computers in the workplace increase professionals' capabilities, efficiency

The In Depth article "White-collar computing: the professional as an artist" [CW, Sept. 2] calls for a reply. I have never read an article that contained so many assertions with which I disagreed.

First, computers effect more than two changes in the workplace. A significant effect that was not mentioned is that they open up new types of work that were not economically feasible on a manual basis. An increase in productivity is not merely a matter of doing the same thing faster. We also do it better through extended capabilities.

Second, although there may be a fascination with direct control of the computer at first, it is efficiency that keeps up usage. People will not use equipment that complicates their tasks. It is easier to develop a report with a good word processor than to write it on a pad.

It is also more efficient to complete a task when the professional's mind is on the subject than to get involved in proofreading and review of output after going on to other projects. Loss of accuracy from proofreading is offset by spelling checkers.

A third fallacy is the picture of "grammarless professionals" turning over control of their output to secretaries and the like. Most professionals have a strong interest in, and are held responsible for, the appearance of their reports.

The article overestimated the importance of documents in professional life. It is true that the appearance of reports is important in communicating the results of a professional's work. However, it is usually a small part of the total task.

**William A. Bryden**
Golden, Colo.

### Magnetic media security systems based on realistic probabilities, not theories

The article " 'Erased' tapes present potential security threat" [CW, Sept. 16] is quite accurate and informative. Unless it is completely read and understood, however, it could lead to the misconception that all used computer tapes and magnetic media should be degaussed and overwritten before disposition is made.

The U.S. Department of Defense has recognized the problem for many years and has required degaussing and overwriting of magnetic media containing sensitive data. Nevertheless, security programs must be built realistically on vulnerabilities and probabilities not on scientific theories.

The risk factor of retrieving data from an erased tape is quite low. Therefore, except for ultrasensitive data that would support the use of sophisticated technical equipment and valuable time of professionals in an attempt to retrieve information from an erased tape, degaussing and overwriting erased tapes would not be cost justifiable.

The expense of such a project would be better allocated to more practical security projects.

**Ted Singer**
San Antonio

# VIEWPOINT

## Pushing the limits of outmoded systems

**THE DATA CENTER**
John P. Murray

What is the average life of an application system? Is it six years, eight years, 10 years? The answer will vary from installation to installation, depending on several factors.

The original quality of the system obviously has a great deal to do with its longevity; good design and good code will last longer than poorly done work. The technology used also has an important bearing upon the length of time the system can be considered productive. The pace at which business functions change may have the most profound impact upon the ultimate life cycle of the particular system.

Some systems never get on-line, even after considerable time, expense and agony. Some do become operational but after a very short time are found to be ineffective and are eventually replaced. Conversely, there are systems 15 or more years old that are still serving organizations today.

The life cycles of systems are likely to become shorter as a result of two phenomena. The rapid advancement of information processing technology makes for vastly improved methods of meeting the needs of the organization. Not taking advantage of them is poor business judgment. Plus, partly as a consequence of the use of new technology, business operations are changing more rapidly than ever before.

New approaches allow greater flexibility and provide for the adoption of different methods. These methods can be used to address various business functions, which can in turn lead to expansion and growth for the organization. The resulting systems that may have been effective for a number of years and still operate correctly simply are no longer viable, given the changing competitive environment. So, although the practical life cycle of the system has not yet been exceeded, the pragmatic life cycle has.

This has serious consequences for information processing management, whose primary responsibility must be to help the organization stay at least reasonably current with the latest technology of information processing. Too often, managers become so engrossed with day-to-day operations that little, if any, thought is given to long-range issues.

#### Hands-on management style

Such a situation is often the mark of a hands-on management style — the apparent need to become involved in all the details of the function. Those with middle-level management responsibilities within the department are not allowed to act on their own, and all decisions are made by the senior manager. Usually such management is the result of insecurity on the part of the person in charge. No one is trusted because they may make mistakes, therefore, the senior manager must be involved in everything.

Given that particular management style, there is usually considerable comfort with the status quo. Although it may tend to prolong the life cycle of applications systems, in the long run, it is not in the best interests of the organization. In some organizations, it is considered an achievement to point to systems that have been in operation for considerable periods of time.

Who can say how much damage has been rendered to the organization because of continued forced reliance on these outmoded systems? Investigation probably would uncover a number of instances where requests for change or modification to the system have been denied as technically impractical because of the obsolescence of the technology.

#### Inadequacy to support actual needs

The real problem with the continuing use of old systems, even if they do operate reasonably well, is that they are probably increasingly inadequate to support the actual needs of the organization. This becomes not only an issue of technology but also of how that technology will be applied to help the organization move ahead.

Consider the current turmoil in the financial industry, particularly in banking and insurance. Not only is competition increasing, but changes in regulations and the manner in which these businesses operate mean that systems life cycles will be shortened considerably.

As business requirements expand, organizations find that information processing systems currently in place are inadequate. The information processing department must be sure that the organization's applications systems portfolio is not allowed to become obsolete. If appropriate attention is not devoted to the issue, the buildup of a large number of old systems presents a considerable risk to the organization.

The expense associated with the renovation of these systems is one serious problem. The negative impact on both the current business and new opportunities because of system inflexibility is yet another. Information processing departments must monitor the life cycles of their applications systems and take steps to replace the old ones within their organization.

*Murray is director of management and information services for American Breeders Service, a DeKorest, Wis., division of W. R. Grace & Co. and is the author of* Management Information Systems as a Corporate Resource.

## High-tech semantics mire microcomputer potential

**READER'S PLATFORM**
Jon R. David

Microcomputers, more properly their individual, group and corporate users, have been the subject of much bad-mouthing of late, and this strong criticism is frequently coming from learned sources. What have these marvels of technology done to engender such negative feelings? Very little, as their critics say, and that's the problem.

Individual microcomputer systems are often very powerful, capable of all those wonderful things associated with the mighty mini that captured the computer users' imagination only a few years ago. In addition, they can frequently support multiple users or at least the concurrent operation of multiple tasks.

They can work with other microcomputer systems in local networks providing capabilities beyond those offered in the original minis and have access to data bases with virtually every piece of information one could want. The problem, according to critics, is that they're neither viewed nor used in keeping with their potential.

Most microcomputers are used in stand-alone mode only, and they never access available data bases, couple with mainframes or participate in local networks. A great waste.

Furthermore, most micros are used infrequently, only on an as-needed basis, thereby adding more wasted potential. Microcomputer maligners tell of systems used only to get out a few letters or reports, to perform calendar functions or to respond to a few daily inquiries. Some say that certain people use them to play video games; let's hope we haven't sunk so low.

Let's look at these critics for a moment. Many, if not most, are in offices with extra chairs, have typewriters that aren't used a full eight hours per day and have telephones they frequently are not using. They frequently have telex or similar equipment that can go days without use. Those that use public transportation may even own cars just to take them to trains or buses. All that wasted potential and they pick on poor microcomputers. Why?

It's a problem of semantics. People don't go out to buy a microcomputer, they go out to buy a personal computer, a professional computer, a home computer or some other such name of a microcomputer. These devices are viewed as workstations in a business environment, and a workstation should be doing work; if it doesn't, something is wrong.

Minicomputers didn't have this problem when they first invaded the business community. They had previously been known as dedicated application computers before the press bestowed the mini label on them. People were used to minis being dedicated to single tasks that could cost-justify them. Even though today's microcomputer costs at least less than the minicomputer of a dozen years ago, the workstation designation seems to make us forget such things as cost-justification and convenience.

Humor is based on truth, and this truth is that names lead you to expect things. In this case, workstations mean work. They're so inexpensive that almost any application can cost-justify them, but their name makes otherwise reasonable people expect more than is necessary of them. The solution is obvious: change the name.

#### Renaming workstations as play stations

Workstations of all types should now and forever be known as play stations. Sure, it doesn't sound professional, but who cares? Wouldn't you rather get paid for using a play station than a workstation? How bad would it be if a tense employee played a video game on a play station? And, what employer or computer critic could complain about play stations being underused?

Workers, from clerks to executives, frequently have dolls, ornaments or games at their desks, sometimes even on top of their workstations. Work environments are not all somber. What would be better received by one and all than play stations?

Although many people may now resent the use of workstations, play stations would be welcome and would probably encourage users to learn more thoroughly how to use them. The use of play stations might even get some of the hackers into a business environment, and what company couldn't use the rare skills exhibited by hackers?

I don't disagree with those who point out that the vast majority of workstations are not being used anywhere near their potential. I must, however, point out that the majority of microcomputer users can cost-justify their systems. Continued criticism of all but utopian utilization makes potential users leery of becoming actual users, lest they become the focus of both internal and external critics.

The renaming of workstations to play stations should eliminate the fear of criticism, and, if they are ever used for more than the applications that cost-justified them, it would be an added bonus.‡

*David is a telecommunications consultant based in Tappan, N.Y.*

# Vendors attempt to diagnose trade show debilities

By Jeffry Beeler

SAN FRANCISCO — Once again, vendors galore are working themselves into a tizzy over the alleged poor quality of many of the industry's largest and best known trade shows. In particular, the companies are fuming about the perceived inability of many trade show product exhibits to generate enough solid sales leads to justify their whopping costs.

And once again, the people who are bearing the brunt of the exhibitors' wrath are the conference organizers, who are often chastised for failing to make their gatherings sufficiently attractive to the right kind of visitors. The complaint that sponsors are ineffective in qualifying their trade show attendees is certainly nothing new.

**WEST COAST UPDATE**

Recently, however, the vendor griping has grown to unprecedented proportions. The reasons for the rising chorus of discontent are at least twofold. First, exhibitors are becoming increasingly sophisticated in trade show evaluation and thus are more conscious than ever of the events' shortcomings, according to Joyce McKee, senior consultant with B. R. Blackmarr & Associates, Inc., a Dallas-based consulting firm.

Second, the mushrooming price tag of trade show exhibitions has greatly increased the pressure on vendors to show a reasonable return on their investment. Just one exhibit nowadays can cost its owner up to $500,000 in booth space rental, travel expenses and other overhead items, according to Brian Blackmarr, the consulting company's founder.

Whatever the reasons for their collective dissatisfaction, a group of highly prominent vendors joined forces last November to figure out why their recent trade show experiences had been so disappointing and to devise some possible remedies. In their efforts, they received considerable support from Blackmarr and his colleagues.

### Conducted research

"They [the companies] asked us to conduct research to determine what corporate decision makers want to see at a trade show and how the shows can be changed to encourage those people to attend," Blackmarr said.

During the 10 months that have passed since they first pooled their resources, the participating vendors have met repeatedly with Blackmarr's staff to review their latest research findings and discuss future directions for investigation. The first of the meetings coincided with the Office Automation Conference, which took place in February. Since then, the group members have gathered three other times, the latest of which came in July at the close of the National Computer Conference (NCC) in Chicago.

Additional meetings will almost certainly follow soon. But in the meantime, participants and interested bystanders continue to discuss the trade show issue casually at nearly every opportunity, one of the most recent of which came in San Francisco during the Information Technology Conference and Exposition (Intech).

"Our intent in conducting the research is to work hand in hand with the various organizers to compile the first accurate statistics about exactly who attends trade shows," McKee said during an Intech interview. "We're definitely not trying to use our study results to threaten the organizers in any way."

Although Blackmarr's research is still a long way from completion, it has already shed light on the important question of what motivates exhibitors to attend trade shows in the first place. The answer apparently has to do with peer pressure. "Companies figure that if IBM is exhibiting at a conference, they have an obligation to be there, too," Blackmarr said.

But the work also has profound implications for trade show organizers, who will have to redefine fundamentally their roles if they want their events to continue prospering indefinitely, Blackmarr said.

Sponsors of large, established industry gatherings like NCC need to increase their emphasis on practical education and improve the degree of integration between the events' product exhibits and their conference programs. "For those who attend them, big horizontal shows should become the equivalent of a mini degree in how to use high technology," Blackmarr said. "If NCC and other large established events don't make themselves more educational, they may eventually be replaced by smaller, more vertical shows," he warned.

Trade show organizers should also take an increasingly active role in advising exhibitors on how to attract qualified prospects and thus maximize their exhibition payoff, according to Robert Harar, president of National Trade Productions, Inc., Intech's sponsor.

But by no stretch of the imagination does the burden for optimizing trade show results fall entirely on the organizers. Exhibitors, too, need to accept a certain amount of responsibility for their own trade show fate. In particular, vendors have to improve their efforts at "boothmanship," self-promotion and sales-lead followup, Harar said.

One vendor that has particularly distinguished itself at both self-promotion and followup is Digital Equipment Corp., he added.

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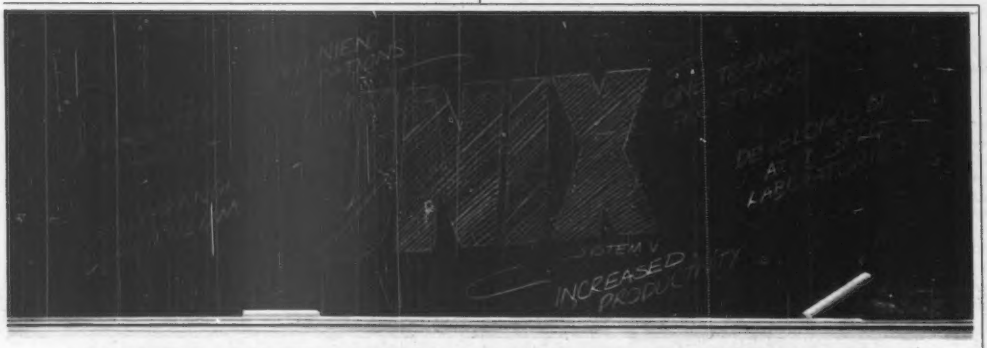

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# Global, NAS ink OEM pact

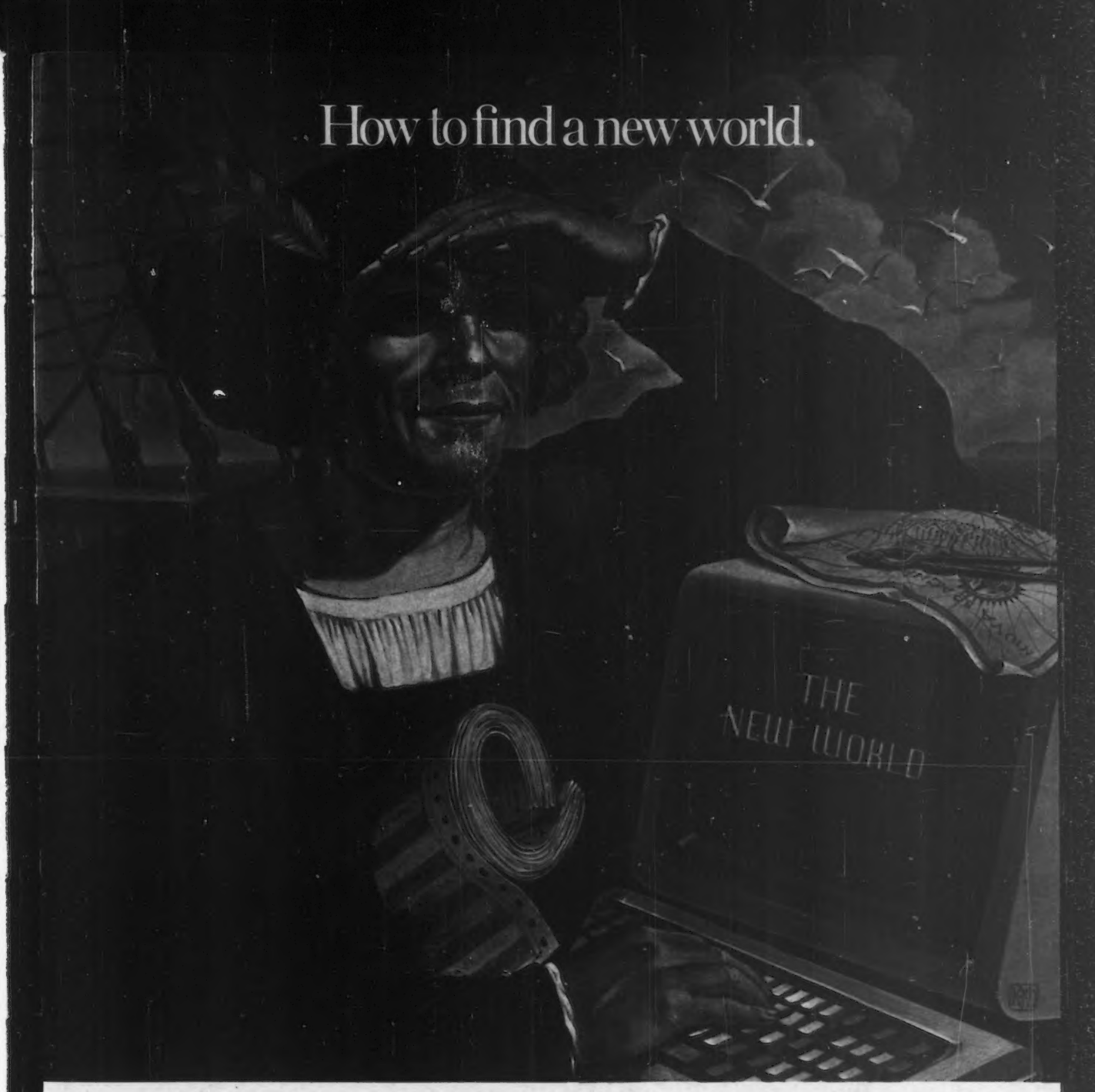
BOULDER, Colo. — Global-Ultimacc Systems, Inc. announced last week that it has reached an agreement to market IBM 4300-compatible processors that are manufactured by Hitachi Ltd.

Global-Ultimacc's OEM agreement was signed with National Advanced Systems Corp., the subsidiary of National Semiconductor Corp. that markets Hitachi systems in the U.S.

Announcement of the agreement came on the heels of Global-Ultimacc's divorce from troubled Storage Technology Corp. [CW, Sept. 23], which had owned almost 60% of the Boulder-based company.

The company will market the processors as more powerful models in its 50 series of 4300-compatible processors.

# How to find a new world.

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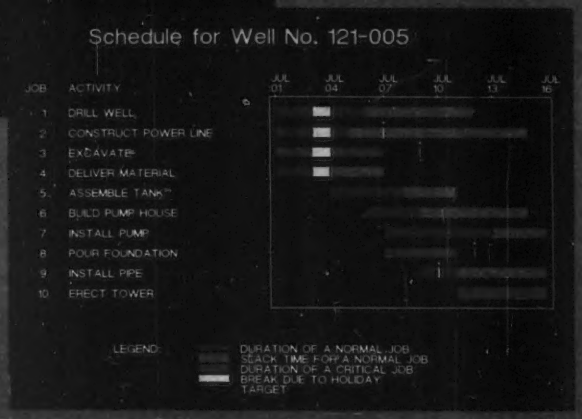

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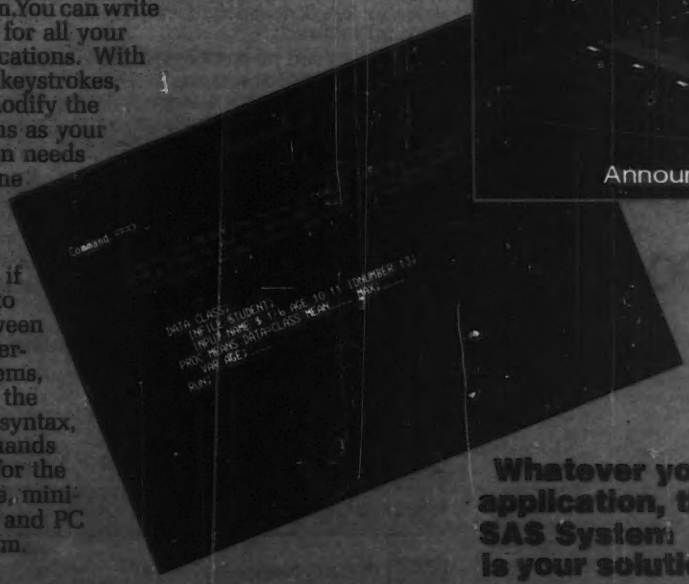

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# WHODUNIT

## Sortland Yard warns against "Raffles-type sort programs."

## Call (201) 568-9700.

## Ask for Inspector SyncSort!

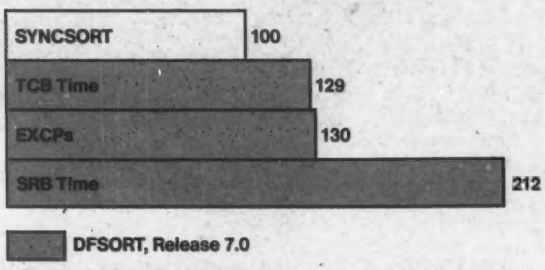
In an extraordinary move, Sortland Yard today warned data processors throughout the world to be on guard against what it termed "gentleman-bandit sort programs."

The warning was issued by one of the Yard's best known figures, Inspector SyncSort, who has sometimes been called "a legend in his own CPU time."

The inspector said, "One of the difficulties in apprehending these chaps is that they look so eminently respectable. They're members of a fine old hardware family. They've been to the right schools. And they invariably carry out their burglaries while wearing a dinner jacket from Saville Row."

**EXPERT COMPUTER CRACKERS.** "But once the party is underway," the inspector said, "these chaps head straight for the place where the family jewels are kept. They can crack open a computer and make off with a king's ransom in computer resources before you can say 'Hound of the Baskervilles.'"

To indicate "the true cost of this sort of misbehavior," the inspector released the following crime statistics:




**SOMETIMES TAKE HOSTAGES.** The inspector noted that these black-sheep programs often "take a dreadful toll" of programmers. "They are often tied up for days on end and forced to perform unnecessary coding, compiling and debugging. And they are heartlessly deprived of the labor-saving features that are taken for granted in most parts of the civilized sorting world."

Among these the inspector listed:

- **SORTWRITER**
- **MULTIPLE OUTPUT**
- **RECORD EDITING**
- **FAST FILE COPY**
- **MAXSORT**

**TELEPHONE BEST DEFENSE.** The inspector urged data processors to call the Yard immediately if they suspect their center is infested by a Raffles-type sort program. "The number is (201) 568-9700. We'll send over one of our highly trained sort detectives to track the culprit down."

Questioned as to what would be done with sort programs caught burglarizing computer centers, the inspector replied. "They will be given a just and speedy trial. If found guilty, they will immediately be transported to Iran!"

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# SOFTWARE & SERVICES

## Ease-of-use issue stalls links' growth

### Current tools inadequate for users' needs: speaker

By John Desmond

DALLAS — Micro-mainframe links may be a hot button in the industry, but the products so far fail to deliver on the ease-of-use promise that will make them practical for nontechnical end users.

So said two users at a session titled "The Micro-Mainframe Link" at the recent Software/Expo conference. The users, one from a Chicago hospital and the other from a New York-based advertising agency, described their continuing — often frustrating — efforts to implement micro-mainframe products as mainstream DP tools.

John C. Wade, director of information systems at Northwestern Memorial Hospital in Chicago, said, "I don't believe the products are in place today to allow a micro user to participate in an expanded network. I need something today that is easy and efficient for them to use. I am concerned that the end user cannot access that information without learning my business, which is DP."

Northwestern Memorial Hospital, which had $315 million in revenue last year, needs the micro-mainframe link to help keep treatment costs in line with federal reimbursement guidelines, Wade said. The hospital has recently been expanding its information systems and now has a DP budget of $8 million with 600 IBM 3270-type devices linked on-line to its mainframes. A total of 140 micros are installed in 67 departments. Wade characterized Northwestern as an information systems leader in the health care industry, which he said has lagged behind many other industries in exploiting high technology.

One-third of the hospital's planned information system growth will be in support of the micro-mainframe environment, Wade said. At present, four micro-mainframe pilot projects are ongoing, in the financial applications of budgeting and reimbursement diagnostics and in patient care applications of patient records and records evaluation, Wade said.

"The federal government reimburses hospitals by diagnosis today," Wade explained, noting there are 467 medical diagnosis categories. "A main reason we're anxious to support a micro-mainframe link

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■ Robert Reck on building management information systems with the help of decision scenarios/24

■ Fel Computing introduced Version 1.01 of its Mobius microcomputer-to-host link for IBM and Digital Equipment processor users/26

■ AT&T unveiled a raft of software for its 3B line of processors/28

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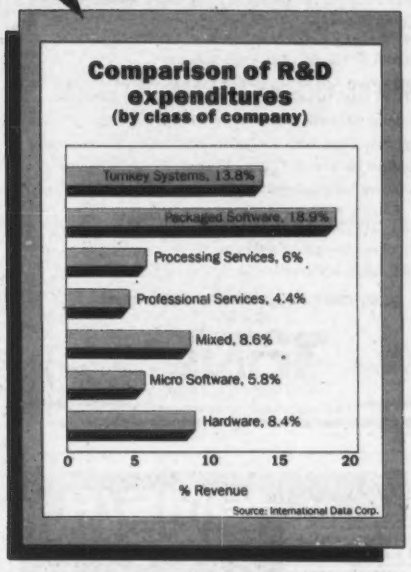


## IBM adds planning module for manufacturing package

Among a series of software product announcements for manufacturing, engineering and office users, IBM recently announced the Capacity Requirements Planning (CRP) module for its Copics manufacturing software running in DOS/VSE and OS/VS environments.

CRP takes the materials plan produced by a Copics module and schedules it against available manufacturing resources, a spokesman said. The program calculates the expected load on each resource. Load profiles are produced for selected work centers to identify potentially overloaded areas.

The CRP module is meant to assist production planners in producing a balanced materials and capacity plan. CRP is priced at $18,000, a one-time charge, and is scheduled for fourth-quarter availability.

Other announcements include the following:

■ Release 1.2 of the Engineering/Scientific Support System (E/S3). A total of 14 programs have been replaced in Release 1.2 with either enhanced or new programs. E/S3 is said to reduce the complexity of selecting, installing, administering and maintaining systems and applications software for engineering, scientific, business, office and data base applications. The program runs in VM/CMS environments.

E/S3 offers users pretested configurations for IBM 4300 systems, including IBM 3370 and 3380 disk drives. The product is also said to simplify installation procedures and program maintenance.

Among the updated programs in E/S3 are ISPF Version 2, Release 1 and ISPF/PPF Version 2, Release 1. Prices for all programs remain the same. The one-time charge for E/S3 Productivity Facility, which provides dialogues and examples to assist users with E/S3 facilities, is $2,000.

■ Release 2 of the APL2 language, which is said to provide DP profes-

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## Oracle announces portable version of IBM SQL/DS and DB2

Any application written for IBM's SQL/DS or DB2 relational database management systems will now run without modification on DEC, DG, AT&T, HP and several other manufacturers' minis, and a wide range of micros, including the IBM PC/XT and PC/AT.

Oracle Corporation introduced the first relational DBMS in 1979. Today ORACLE is the only relational database management system that is completely compatible with IBM's SQL/DS and DB2. Programs written for SQL/DS or DB2 will run unmodified on ORACLE.

Originally designed for IBM mainframes and DEC superminis, ORACLE is now available on a wide range of machines, from mainframes to PCs. And ORACLE includes an integrated set of 4th generation software tools not available with either SQL/DS or DB2.

■ **Why not Cullinet, ADR or Focus?** There is a clearly defined standard for relational database systems. It's called SQL, and it's from IBM. Both ANSI and the US Government are in the process of adopting SQL as *the* standard database language. The Cullinet, ADR and FOCUS software packages each implement their own unique database language - each one painting the user into its own corner. Since its inception, Oracle Corporation has provided total IBM SQL compatibility.

Few shops nowadays run only IBM mainframes. Why, then, even consider a database solution that runs *only on IBM mainframes?* Applications written with ORACLE run identically on mainframes, minis, and PCs. Because all versions of ORACLE *are* identical.

FOCUS, Cullinet and ADR offer either a limited subset, a completely different product or nothing at all (respectively) for the PC. And none have minicomputer products.

■ **Why not just go with DB2 or SQL/DS?** A relational DBMS simplifies but does not by itself eliminate application programming. Additional tools are necessary if users are to create and maintain their own applications.

DB2 and SQL/DS are relational systems, period. ORACLE is a relational DBMS plus integrated 4th generation software tools for application generation, report writing, color graphics and network communications.

Furthermore, SQL/DS and DB2 run only on IBM mainframes (and are somewhat unlikely ever to run on another vendor's system). ORACLE runs on more IBM hardware and operating systems than do IBM's relational products.

■ **What about Goldengate, dBase III, Symphony or Framework?** PCs need more than PC software if they are to be usefully integrated with corporate data processing. Incompatibility with SQL, while serious, is not the only major problem with these micro packages. None provides an acceptable level of data security, integrity or recovery facilities. And their PC-to-mainframe links are functionally primitive and difficult to use.

To effectively link computers, all machines in the network should run the same software. Only ORACLE provides standard software on mainframes, minis and micros. Data and programs can then be shared among users of different machines, distributing the workload.

ORACLE is currently installed on over 1000 mainframe and supermini systems around the world, as well as on thousands of PCs. Oracle's customers include 8 out of the 10 largest U.S. corporations, as well as major foreign companies and government agencies.

For further information, contact Oracle Corp., Dept. C2, 2710 Sand Hill Rd., Menlo Park, CA 94025, or call 415/854-7350.

# Decision scenarios ensure info system meets business needs

SOFTLINE
Robert H. Reck

Communication between builders of management information and the managers they intend to serve is usually good. Thus, the systems built for the managers are always successful in meeting the managers' real business needs for information. Right? Wrong.

Experience at many firms indicates a number of problems in this communications link and, subsequently, in the usefulness of the resulting system. These problems fall on both sides of the systems/managerial fence.

Often, the manager abrogates the responsibility for building a meaningful system. The staff is supposed to be psychic in determining what the boss needs to know and providing it — no more and certainly no less.

However, overzealous information systems builders can drive business executives into a data-rich, information-poor situation, which is increasingly characteristic of many of today's businesses, by adding to the system data elements that may not be needed.

What can be done to improve the communication of management support needs and the delivery of the action-oriented systems a business can actually use?

### Use decision scenarios

One answer, proven in many experiences, is the use of decision scenarios.

A decision scenario, as its name suggests, is the description of a particular business problem for which appropriate decisions must be made.

The business problem for a scenario is chosen by the business area manager during an interview with the company's systems analyst-builder.

Then the analyst-builder outlines and refines the decision scenario, a hypothetical situation rooted in the manager's functional area and tied to the part of the business that needs support.

The information that could help manage the particular business problem is postulated by both the manager and the analyst-builder, resulting in the development of management support systems that are effective and created with low risk.

### A dynamic approach

This dynamic approach to management support systems development is in contrast to traditional, static approaches that develop a snapshot of the business situation merely through a functional specification. The decision scenario unfolds over a period of two weeks or months through careful, two-way communication between the developer and the "owner," or system user.

A decision scenario should not be confused with a critical success factor analysis or a prototype. A decision scenario is to be used as a link between the identified critical success factors and the actual prototype stage.

Recently, the decision scenario process was used at a major manufacturing company. The company determined that one of the major critical success factors requiring information support involved the timely purchase of raw materials. The vice-president of purchasing, identified as the owner of this critical business area, worked closely with the systems analyst-builder to create a hypothetical situation that would help identify what type of information and information systems were needed to manage this critical business area.

In their first meeting, the vice-president and the analyst-builder discussed the business of purchasing as it affected the manufacturing company. The vice-president of purchasing was highly skeptical that information technology could help him manage his responsibilities. He had always used manual techniques and maintained manual records in which he had a high degree of confidence. The analyst-builder assured him that the information and techniques he needed to manage his business would be developed independently of any technology considerations.

In the series of interviews that followed, they were able to construct the decision scenario by postulating a purchasing structure that included a listing of raw materials and their suppliers, projected inventory volumes, safety stocks for key customers, sales forecasts and actual volumes and costs.

Over the next few months, during each successive interview, more information was added to the scenario. Its complexity was steadily increased to reflect the full

Continued on page 36

*Reck is a principal with Index Systems, Inc. in Cambridge, Mass.*

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# Version 1.01 of Mobius integration system debuts

## Allows transparent access to DEC hosts

Fel Computing in East Dover, Vt., has released Version 1.01 of Mobius, a microcomputer-to-mainframe integration system said to give IBM PC-DOS, Microsoft Corp. MS-DOS and Digital Research, Inc. CP/M users transparent access to the resources of Digital Equipment Corp. Decsystem-10, Decsystem-20 and VAX hosts.

Version 1.01 provides VT100 emulation for the DEC Rainbow, IBM Personal Computer and Personal Computer XT.

The VT100 emulator is compatible with such programs as DEC's All-In-One, EDT and TDMS on the VAX; DEC's Traffic-20 and Scope on the Decsystem-20; and similar programs on the Decsystem-10, according to Fel Computing.

The enhanced Mobius is said to generate all VT100 keyboard characters and escape sequences, including those produced by the keypad. VT100 line drawing, arrow keys, LED indicators and video attributes — reverse video, underline, bold and blinking characters — are also implemented, the vendor said.

Mobius also offers an Advanced Programmer's Interface that reportedly enables programs to access functions previously available only to users at the keyboard.

Pricing depends on the number of microcomputers supported. For example, the host Mobius program costs $5,000 for 10 simultaneous users.

Micro Mobius, the micro portion of Mobius, costs $250 in quantities of one to 19, the vendor said.

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# DPS 6 packages launched

Honeywell, Inc. of Waltham, Mass., has announced three programmer productivity packages for use with its DPS 6 small computer family under the Gcos 6 Mod 400 Release 3.1 operating system.

The packages are the Pro-IV fourth-generation application generator from Pro Computer Sciences, Inc., the System-80 Cobol program generator from Phoenix Systems, Inc. and a release of the Info data manager and fourth-generation language from Henco Software, Inc.

Pro-IV applications are developed on-line using menus, screens, on-line Help messages and system security and logic operations.

System-80 is a productivity tool that generates Ansi-74 Cobol programs through the use of data dictionaries and program generators controlled with menus, prompts, attribute screens and tutorials.

Info is a data file management system and fourth-generation language providing data entry, update and query language, along with report writing. Release 9.2 of Info boosts performance 30%, a spokesman said.

The Pro-IV development and execution systems cost up to $8,800. The System-80 initial license fee starts at $5,225. The Info Release 9.2 initial license fees start at $6,800. Info Release 9.2 requires the Gcos 6 Mod 400 Sort/Merge Utility, which costs $135 annually.

# AT&T unwraps applications packages for 3B series

**By Charles Babcock**

MORRISTOWN, N.J. — AT&T Information Systems has introduced 13 applications programs for its 3B computer line, including an integrated office automation package, Prevail.

AT&T developed four of the packages and will market the remaining nine, which were developed by independent vendors. AT&T has certified each package will run under its Unix System V.

Prevail combines spreadsheet, word processing, data base management and communications functions into one program, company officials said. Developed by Inspiration Systems, Inc., it sells for $3,600 on the 3B2 and $7,200 on the 3B5.

The AT&T word processing product, Writers Workbench, has been issued in Collegiate and Professional editions. The $1,500 Collegiate edition runs on the 3B2 and will serve up to 12 users. The Professional edition sells for $795 on the 3B2 and $1,195 on the 3B5, AT&T said.

AT&T has developed a package for service businesses, called AT&T Service Solutions, to handle scheduling, dispatching, service requests, inventory and client billing. It retails for $40,000 to $60,000, spokesmen said. AT&T Dental Solution, a package of scheduling, billing and accounts receivable software developed by Wallaby Software of Ramsey, N.J., runs on the 3B2 and retails for $4,995, spokesmen said.

AT&T Time and Attendance is a time-keeping system for up to 40,000 employees and 500 clocks. It runs on the 3B5 for multiple locations and retails for $25,000. The Unify data base management system from Unify Corp. in Morristown, N.J., retails for $1,995 on the 3B2 and $4,900 on the 3B5, AT&T said.

Unibol is a commercial programming language compatible with Digital Equipment Corp.'s Dibol developed by Software Ireland. The compiler will retail for $2,400 on the 3B2 and $3,600 on the 3B5. Run-Time will retail for $1,200 on the 3B2 and $1,800 on the 3B5. M/ET, developed by Microfocus Ltd., is a Unix-based version of Cobol 74 for application programming. It comes in four modules priced between $400 and $2,000 for the 3B2 and $1,200 to $5,500 for the 3B5.

Visual Menu, developed by Cosi, is a system for visual construction of Unix systems. Its Development System retails for $1,495 on the 3B2 and $2,745 on the 3B5. Run-Time retails for $195 on the 3B2 and $995 on the 3B5. Supercalc3, developed by Sorcim/IUS Micro Software, a spreadsheet and data management package, retails for $795 on the 3B2 and $1,395 on the 3B5. Access Technology, Inc.'s 20/20, a spreadsheet and modeling package, retails for $950 on the 3B2 and $3,800 on the 3B5.

Integrated Compiler Products, developed by Advanced Computer Techniques Corp., provides programs to compile applications written in Cobol, Pascal, Basic or Fortran to run as Unix applications. Prices range from $1,000 to $2,500 on the 3B2 and $2,000 to $6,000 on the 3B5.

## SYSTEMS SOFTWARE

■ **Radian Corp. has enhanced the user interface on its Rule Master expert systems development software.**

The interface is said to provide a screen- and menu-handling feature, one editor for structuring applications and another editor for generating files of examples from which rules are induced.

Called Screem, the screen- and menu-handling feature offers a hier-

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## SOFTWARE & SERVICES

Continued from page 28

archical set of pop-down menus at every step in building an application. Once a pop-down menu is displayed, the user can select a function by using cursor keys or a control character or by typing the expert system development function name.

The structure editor enables a user to display and modify the modular structure of a Rule Master-based expert system by adding, deleting and moving modules.

The induction file editor lets users create and modify example sets from which rules are developed by Rule Master's Rule Maker facility. Rule Maker automatically induces procedural rules from real-life examples of those rules that have been entered into the system by a knowledge engineer. After inducing the rules, Rule Maker is said to generate code automatically in the Radial language.

The interface will be available for AT&T Unix-based systems in the fourth quarter. The price of Rule Master starts at $15,000.

*Radian, 8501 Mo-Pac Blvd., P.O. Box 9948, Austin, Texas 78766.*

■ **Inference Corp. has enhanced its Automated Reasoning Tool (ART) expert system development environment.**

The updated version includes color graphics, a graphics icon library, direct interactive and programmed interfaces to the knowledge base, support for mixed initiative processing, a "pseudo-natural language" syntax and separately compilable rule files.

The Artist graphics component has been extended to include color graphics and an icon library of predefined or user-created symbols that developers can use directly in an application, the vendor noted.

Upgrades to the ART Studio module include a browsing facility that shows graphical views of hierarchical relationships, such as structures on schemas and inferential derivations.

Other enhancements include the ability to query the knowledge base interactively using patterns to find specific data, the ability to add interactively or modify rules incrementally while executing an application and the ability to update dynamically the knowledge base.

A pseudo-natural language syntax option reportedly lets a user build a knowledge base in English-like syntax. In addition, support for mixed initiative processing enables an ART expert system to prompt users for information while also reacting to unanticipated, user-initiated responses, according to the vendor.

Priced at $85,000, the ART release is available for Symbolics, Inc., Lisp Machine, Inc. and Texas Instruments, Inc. Explorer workstations.

*Inference, 5300 W. Century Blvd., Los Angeles, Calif. 90045.*

■ **Systems Designers Software, Inc. has announced an expert system environment shell, Envisage, that reportedly lets designers create applications using artificial intelligence techniques.**

Envisage is said to handle three reasoning schemes: traditional logic, Bayesian Inference and so-called fuzzy logic.

An English-like knowledge representation language consists of rules, facts, actions and questions that can either be free format or structured, according to a spokesman.

An additional facility enables users to suspend one line of questioning temporarily, reanswer any set of questions, compare results and then return to previous lines of questioning to complete the consultation, the spokesman added.

Priced at $20,000, Envisage runs on the Digital Equipment Corp. VAX computer under the VMS operating system.

*Systems Designers Software, Suite 407, 444 Washington St., Woburn, Mass. 01801.*

■ **Software Research Associates has unveiled a Test Coverage Analysis Tool (Tcat) system test package for the C programming language.**

Called S-Tcat/C, the software automates the S1 measure of system test coverage to provide a quantitative way to determine how much of a system's function call structure is measured, the vendor explained.

S1 measures the number

Continued on page 35

So you've been put in charge of making sure data flows smoothly to and from your company's remote offices.

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But the Tower XP recovers so smoothly, so completely, your customers may never know there was a power failure. And that means no more late night calls to restart systems or rebuild lost files. You save time, money and headaches.

Add to this the Tower's other integral reliability features: extensive remote and in-service diagnostics, consistent error logging, an NCR-enhanced UNIX* that virtually never PANICs. And you've got an irrefutable argument for selling Tower XP.

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## SPSS* Graphics gives you great looking numbers for a great little number: less than $9,999.

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Currently available for IBM CMS and DEC VAX computers. SPSS Graphics is compatible with a wide variety of devices. Input can be entered from many popular terminals, including the IBM PC. And output can be directed to a host of plotters, CRTs, slide makers and PC's.

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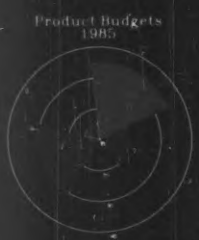


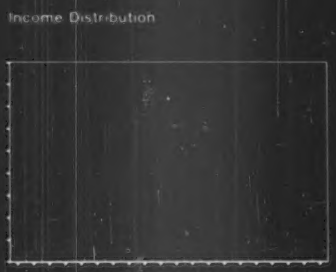

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Continued from page 31

of function calls executed from a calling function as a percentage of the total number of calls. An S1 value of 100% for every calling function in a software system indicates a complete level of system test coverage, according to the vendor.

S-Tcat/C is available for AT&T Unix and IBM PC-DOS systems, starting at $875 for a single-user license. A site license under normal conditions costs $7,000.

*Software Research Associates, 580 Market St., San Francisco, Calif. 94104.*

## APPLICATION PACKAGES

**■ Tektronix, Inc. has announced the Tektronix Spectrum Analyzer Software (Tekspans) family of application software said to automate many measurements done by engineers and technicians.**

The packages run on the IBM Personal Computer and compatibles, the Hewlett-Packard Co. 200 series controllers and the Tektronix 4041 controller.

The first Tekspans application to be announced is the General RF Applications Software Package (Grasp), a menu-driven package enabling an engineer to make spectrum analysis measurements automatically such as swept frequency, signal analysis, harmonic distortion, signal-to-noise ratio, amplitude modulation and frequency response, a spokesman said. The package also supports filter tests and signal search routines.

Grasp allows the user to graph, store, manipulate, analyze and compare data as well as record and plot results using a variety of manufacturers' equipment. Grasp is capable of remote monitoring over telephone lines using modems and of controlling multiple spectrum analyzers such as in a manufacturing environment.

The Grasp package costs $875 and is scheduled to be available Nov. 15.

*Tektronix, P.O. Box 500, Beaverton, Ore. 97077.*

**■ Daly & Walcott, Inc. has enhanced its Customer Service/Shipped Order History marketing assistance program to run with IBM's Mapics II order entry and invoicing system on the IBM System/34 and 36.**

The menu-driven package is said to enable users to retain a history for each order, sequenced by customer and item, as well as providing easy access to information on open orders.

The Customer Service/Shipped Order History program is also now available for IBM's DmasII Release 2 on the IBM System/34 and 36.

The package, including all source code, load and procedure members, documentation and hot line technical support, is priced at $750.

*Daly & Walcott, 120 Lavan St., Warwick, R.I. 02888.*

## ON-LINE DATA BASES

**■ Direct Connection, Inc. is offering a service that will enable end users of IBM and Digital Equipment Corp. equipment to buy and sell used hardware directly with each other, eliminating the need for a hardware broker or dealer.**

Subscribers to Direct Connection may use the service as often as needed without a limit on the number of items that can be listed, the vendor said.

Subscribers will receive names and telephone numbers of potential buyers and sellers of the target equipment, according to a spokesman.

Equipment listings are reportedly submitted by mail, telephone or by on-line access to the data base via this service.

Listings are said to remain in the data base until a sale or purchase is made.

Service subscriptions are offered to end users at the rate of $200 per year.

*Direct Connection, P.O. Box 4510, Rockville, Md. 20850.*

# Reach-Ware line gets message control system

Reach Intelligent Systems Corp. of Amesbury, Mass., has announced the addition of Messagetrieve to its Reach-Ware natural language software line. Messagetrieve is a message control system that provides voice messages over the telephone 24 hours daily.

The company also offers Employee-Trak, a management tool for maintaining and analyzing employee and group accidents, absenteeism, overtime, performance and other human resource measures; and Timetrieve, a scheduling system for the management of time, personnel, facilities, equipment and assets.

Features of Reach-Ware include a 1,000-word vocabulary and English translation routines, on-line user Help, real-time and multiuser applications, full screen editing, error reporting, automatic data base encryption, word processing and print queue handling.

Reach-Ware runs on Digital Equipment Corp. VAX machines, Reach Intelligent Systems said.

According to the vendor, the price for the three additional modules ranges from $3,000 to $17,000 each, depending on the CPU.


# PROTOCOL-CONVERTER COMPETITION AGAINST WALL

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| DIALRACK SECURITY OPTION | YES | YES | NO | NO | NO |
| DOWNLOAD NEW PROTOCOLS | YES | NO | NO | NO | NO |
| REMOTE SW DIAGNOSTICS & LINE MONITORING | YES | NO | NO | NO | NO |
| $ PER LINE | $353 | $644 | $332 | $667 | $529 |

If you're about to sign a purchase requisition for a non-Wall Data protocol converter, it would be in your best interest to throw your pen toward some non-populated area of the office. Trust us. You can retrieve it after you've read this ad.

You have all these ASCII minicomputer terminals and personal computers. Right? And you want them to be able to communicate to a host mainframe or a System 34/36/38, some perhaps over phone lines, in SNA/SDLC, BISYNC, etc. Right? And you've done your homework. Right?

Then ask yourself the same five questions your management and staff are guaranteed to ask you over the lifetime of the product. Over and over again:

1. Can you handle multiple, concurrent protocols to multiple hosts? Not unless your protocol converter is from Wall Data.
2. Is your data secure from unauthorized outsiders who dial in? If your protocol converter doesn't ask for a user's ID and then hang up and call back to the authorized phone number for that user, you're asking for trouble. Why not ask for Wall Data?
3. Can you just download protocol software when new protocols become available? Or when software enhancements are made? You can't with the others.
4. If you suspect there is a problem with either the system software or a data line, can you dial into the protocol converter's console port and do remote diagnostics? Yes, but only with Wall Data.
5. What is the price? Actually, it's quite high...if you aren't dealing with Wall Data. For all the above reasons. Plus the obvious fact that Wall protocol converters are the market price/performance leaders.

Now, about that pen you threw across the office. If someone asks you about it, just say you were conducting an experiment. Then ask them to kindly bring you your pen...and a blank requisition form. You can now conduct your experiment.

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Now that you have that blank requisition form, call 206/883-4777 for help in filling it out. You can return the unit within two weeks without obligation. So far, we've shipped hundreds of units. We've gotten back two things: Prompt payment and stories of how our competitors have reacted to going up against ...the Wall.

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From page 24

## Info systems need decision scenarios

scale of anticipated or unanticipated problems in the business area by hypothesizing some information on paper charts using scales of unavoidable, acceptable and favorable.

Then, in a series of working sessions with the vice-president, the analyst-builder showed how obtaining and using the right information could help in purchasing raw materials on a timely basis.

Through simple, limited examples, the analyst-builder taught the vice-president to use both the information and the initial technology itself to improve company inventory and stock control, safety stock management service for customers and evaluation of stock offerings by suppliers.

The vice-president never knew that the "system" the analyst-builder was showing him was just a shell. Like the kind of stage sets used in western movies, the required data is visible, but the supporting structure is initially nonexistent.

This technique allows both parties to experiment with data needs and uses before the project becomes too costly to alter. Usually during this stage in the process, the scenario changes often.

After five working sessions, the decision scenario was well defined and close to the real business situation at the manufacturing company.

Prototyping began, and after using successive prototype versions of the system, the vice-president of purchasing's original skepticism was transformed into enthusiasm for both the project and technology use.

Through this dynamic process, the company created a valuable, low-risk, low-cost business tool that continues to be used and praised by senior management.

> ❞
>
> *Overzealous information systems builders can drive executives into data-rich, information-poor situations.*

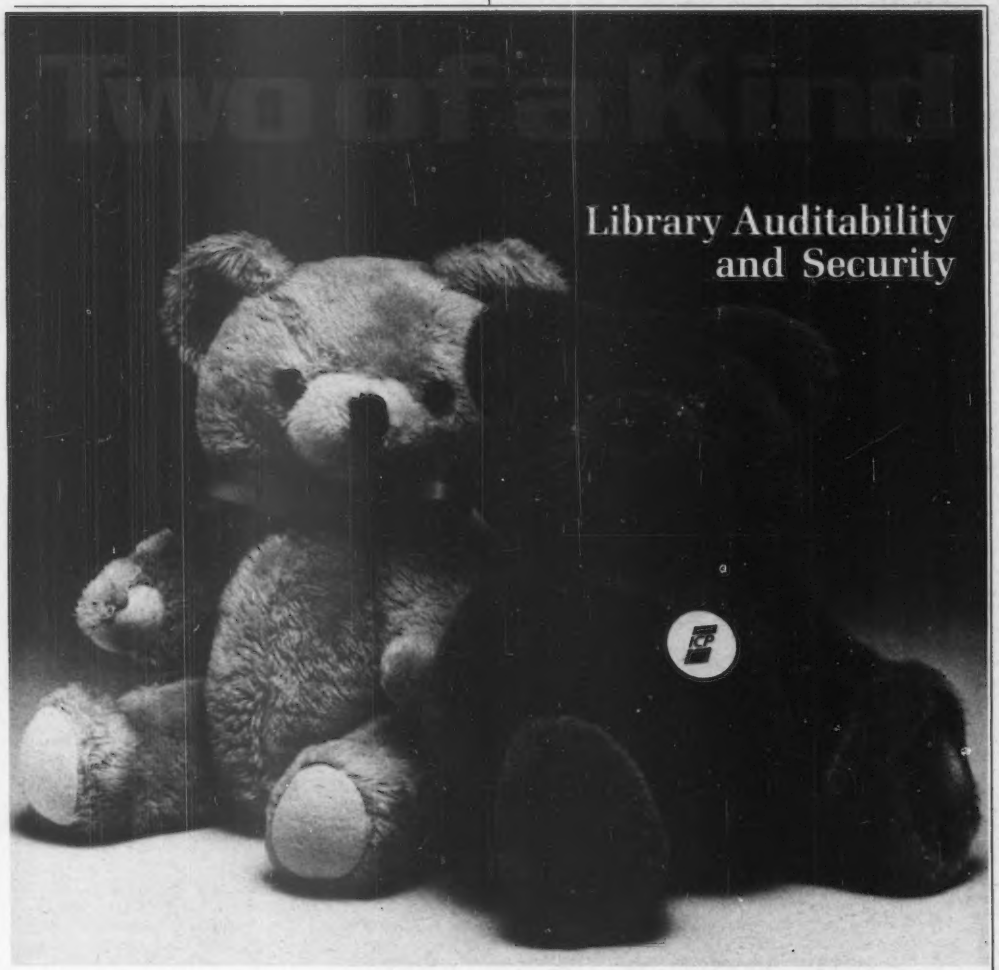
When building a management information system, critical success factors and prototyping alone are not enough.

As this manufacturing company discovered, the use of a decision scenario improves the communication of management support needs, thus facilitating the delivery of action-oriented systems.

### Four key elements

To put decision scenarios to work in your company, keep in mind the four key elements followed by the manufacturing company in this example.

- Target your decision scenario on a critical area of the business after critical success factors have been determined.
- Construct your scenario around the business questions a manager poses and the key assumptions to be tracked in each critical business situation.
- Develop decision scenarios without considering the available data or technology that will be required. Focus on information content, not technology and data availability.
- Show the manager what information is really needed to manage the business area.

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## Ease-of-use issue stalls links' growth

is that it will have a direct financial impact on our organization," he said. Using the links, hospital staff members analyze ways to treat patients "more expeditiously and to discharge them more rapidly," Wade said.

Implementing the four pilot links has not been easy. More than 700 hours were spent finding out what data users wanted for the financial applications, and more than 400 hours went into developing the diagnostic applications. The data usually resided in different mainframe locations, so new files had to be created to service the links. Response time for the 600 on-line users could not be sacrificed, thus performance was a major consideration.

Micro-mainframe links are expected to help reduce the length of patient stays, and Wade said Northwest will continue to evaluate link products.

The hospital has found that the more transactions end users process per patient, the less time, on average, the patient stays in the hospital.

Peter F. deVaux, senior vice-president of finance and former MIS director at Young & Rubicam, Inc. of New York, said, "We'll be testing [micro-mainframe link products] for a long time and will not settle on anything for a while, because I don't think there is anything out there yet to settle on. We will continue to go through a period of uncertainty."

When his company began trying to integrate its micros with mainframe applications in 1983, deVaux said, "It was a lot tougher than we thought. We read in the magazines about how everyone was doing this, but we couldn't find anyone to talk to."

The advertising agency now has micro-mainframe experiments under way in 10 departments. Each department settled on a local-area network for its micros before testing a link.

"We expect ultimately, 10 or 15 years from now, to find ourselves with a hierarchical structure, only sharing data and applications that need to be shared at a level necessary to get the job done," he said.

Technical roadblocks to achieving that goal include linking diverse operating systems, communications software and data base management systems in place at the company, he said. Other issues include deciding who will have overall responsibility for the links, who will provide support and who will conduct training.

"The disciplines, controls, structures and planning for integration must be in place before we can achieve integration with the micro-mainframe links," deVaux said.

Vendor Gary Durbin, chairman of the San Francisco-based Tesseract Corp., which markets the Merlin/IDL micro-mainframe link, said, "I agree the link solution is not here yet" because unsophisticated users may have difficulty with the products. But the direction of his and other company's products, he said, will be for links to become more intelligent and ease interface problems for the user.

"The links have a tremendous responsibility to transform data, so the links have to become more intelligent," he said.


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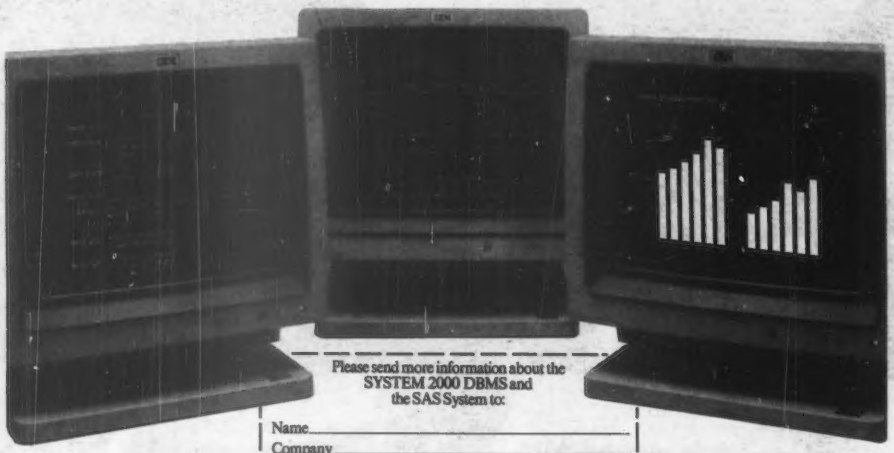

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From page 23

## IBM adds planning module for package

sionals with a productivity tool for prototyping and applications development. APL2 runs in MVS/370, MVS/XA, VM/High Performance Option or VM/SP environments and uses companion products DB2, SQL/Data System, VM/SP ISPF Dialog Manager and Graphical Data Display Manager.

Release 2 is said to provide calls to routines written in other languages, including Fortran and assembler, access to system editors such as Xedit and ISPF and language enhancements such as lowercase alphabetics in APL2 names. The one-time charge for Release 2 of APL2 is $14,000.

■ A series of enhancements to System/38 languages and utilities, including Basic, Cobol, Business Graphics Utility, PL/I, RPG-III and Office/38 Text Management.

Enhancements to Basic include improved translator optimization said to enable users to specify whether the translator should take additional time to generate a more efficient object program. Additional mathematical functions supported in System/38 Basic include arc sine, arc cosine and cotangent.

Charges for all the programs remain the same.

■ IBM 8100/DPPX Case Processing System, offering support for case processing in the DPPX environment. The program is typically used for loan application processing and insurance claims processing and is priced at $4,250, a one-time charge.

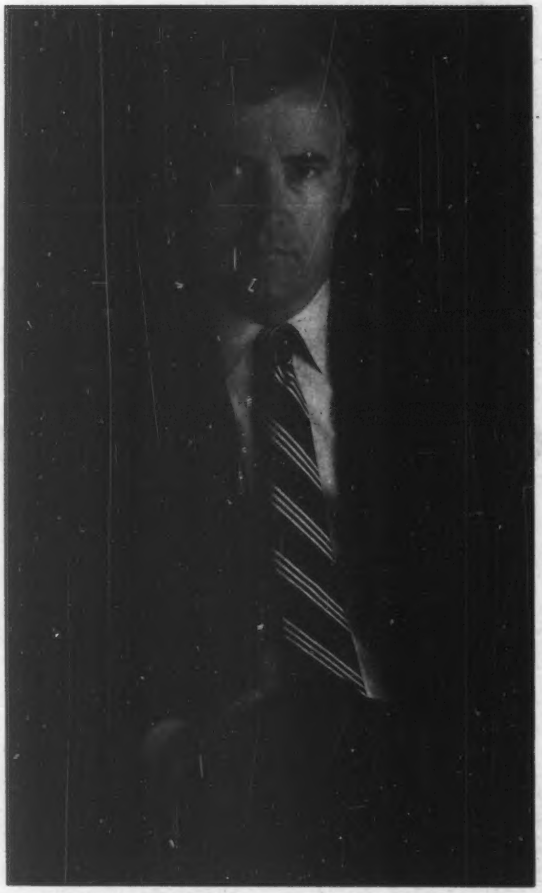
■ Tape Automation for the Production Environment for VSE/SP 2.1, a tool for managing tape libraries in DOS/VSE shops. Standard and externally labeled tapes are supported. The program is priced at $2,200.

■ Data Base Migration Aid Utility, assisting IBM DB2 users and data base administrators in migrating data and data descriptions between DB2 systems. The product is priced at $4,000.

"Whenever it retrieves data, it expects a finder's fee."

# Straight talk about application software packages.

# "Most application software packages are functionally rich. The problem is, that's simply not enough."



While everyone agrees that packaged applications possess great potential to save time and money, you'll hear a lot of people—from MIS directors to operations managers—tell you the ones their companies have implemented fall somewhere short of satisfactory.

Typical limitations include the fact that the packages require such extensive modification that the savings they seemed to offer totally disappear. Another common complaint is that one application package fails to integrate with another. A third shortcoming, and perhaps the most common, is that packaged applications cannot be easily adapted to reflect the changing nature of the business.

You have only to look at the architecture of most of the applications currently in use to understand why these problems exist.

Many companies today depend on applications designed with technology from the 60's and 70's. Some are 2nd generation applications built without any reliance on database architecture. Others are 3rd generation applications that provide only a generalized *interface* to a database management system; in addition, many application vendors provide a common front end user interface to mask inefficient architecture. The result is that these 3rd generation applications realize only about 10% of the power of a DBMS. *And that's simply not enough.*

Without full use of the facilities of a superior DBMS, users of application software find it extremely difficult to adapt and extend an application package to their current as well as to their future business needs. And *only* when an application is built with advanced database technology can it provide the sharing of data that leads to functional integration between different application modules.

Ultimately, what's required is software that goes beyond the conventional packaged applications approach.

*What's required is 4th generation applications software—software that's rich in functionality, and whose underlying architecture is built on, and takes full advantage of, advanced database technology.*

Fourth generation application software is created using a comprehensive application development facility combining a fourth generation language and end user query and reporting facilities with an integrated data dictionary. Furthermore, fourth generation application packages are functionally integrated, sharing common data between independent modules. This creates an environment to easily adapt and extend an application package, and provides realtime access to all information.

Only fourth generation application software packages enable a company to realize the full potential of packaged applications.

It is clear, therefore, that all application packages of the future will be built using this technology…because it doesn't make sense any other way.

John J. Cullinane
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### 2. Functionally Integrated

Businesses today demand applications to do more than address individual functions. Businesses today need applications that recognize the interdependencies within an organization—in short, applications that can share data. For example, efficient real-time, four-way matching of invoices with receiving, purchase and inspection documents can only be achieved through true sharing of data, and this sharing of data can only be achieved with an advanced database technology which delivers that integration. Redundancies are eliminated and productivity is increased when all applications dynamically reflect the operations of the organization. By sharing an architecture that provides for optimum use of an organization's information, Cullinet's manufacturing, financial, human resources and banking applications fulfill this need.

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Although many businesses appear on the surface to operate in a common fashion, each, in fact, is unique. Applications must therefore be built with an optimized set of tools that permits them to be adapted to a company's way of doing business, rather than having the company have to adapt to accommodate the software. Cullinet applications are designed to accommodate change. They provide the means to personalize screen layouts, capture new information, reformat reports, resequence transactions, and change messages without impacting the entire environment. Only Cullinet's applications can provide this environment for adaptability through their integration with advanced database technology. In this way, Cullinet applications give users the independence to adapt them—quickly and efficiently—to meet the unique requirements of the business.

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As a business changes and grows, so do its needs and requirements. Cullinet provides easy to use, menu-driven facilities that permit functional extension of an application while preserving integration. An end user can quickly react to new requirements by prototyping an application functionally, developing new reports and performing ad hoc queries immediately. MIS can efficiently develop new, associated applications sharing common data and built utilizing the existing architecture. The Cullinet architecture segments the program logic, edit and validation criteria, as well as the security and recovery process, and therefore the complexity of creating new application functionality is significantly reduced.

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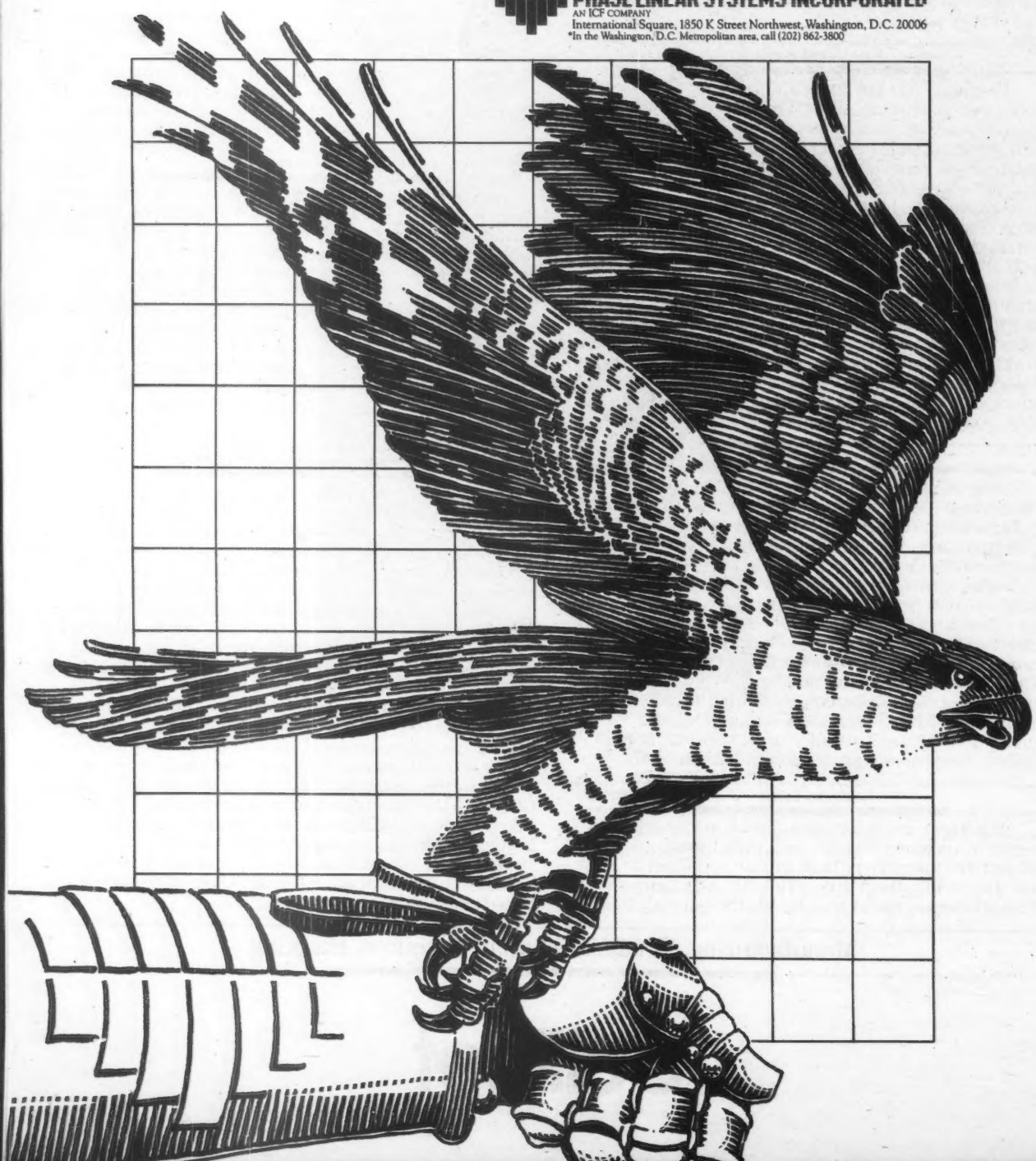

IN DEPTH

# The best policy is missing deadlines — sometimes

By Meilir Page-Jones

*The story of the Afghan boots shows what happens when DP meets the user's project deadline but not the user's needs.*

The term *deadline* is derived from a line in a prison beyond which a prisoner would be shot if he strayed. Given this context, it is hardly an appropriate term for the estimated completion date of a project.

But its derivation may account for the terror that deadlines instill in so many managers. Project deadlines have acquired almost mythical powers in the minds of project managers. Worse still, many project members feel that the deadlines assigned to them are unrealistic. A significant number of projects fail because of a manager's fanatical devotion to an unachievable deadline.

But realistically, I have yet to see anyone's world come to an end or any project canceled merely because of a missed deadline. Projects *are* canceled for patently failing to meet users' needs in a cost-effective way — not for being a month or two late in completion.

Satisfying users' requirements effectively must be the No. 1 priority. Today more than ever, a company's DP department and the quality of the systems it produces directly affect the entire company, no matter in what business that company is.

*Page-Jones is president of Wayland Systems Development. He is the author of* Practical Guide to Structured System Design *and* Practical Project Management, *on which this article is based.*

Unfortunately, the tremendous pressure to develop software systems more quickly has simply meant that more bad systems are being turned out. In DP no less than anywhere else, you get what you pay for — a lesson I learned only too well in another part of the world.

During my youth, I spent some time in Afghanistan. A custom in that part of the world dictates that you never pay the asking price for an article in a market or a shop. You are expected to haggle, much in the same way you negotiate the price of a used car in this country.

This haggling forms the basis of an elaborate social etiquette. For expensive articles, the process may last for several hours and involve much tea drinking and pipe smoking. After a while, I considered myself to be a skilled bargainer, often leaving a shop after an hour or two with the shopkeeper wringing his hands at the low price my adroitness had forced him to concede.

Afghanistan, and the capital city of Kabul especially, is noted for the craftmanship of its boot makers. Afghan boots are made from the finest leather and are adorned with exquisite stitching along their sides. A boot maker will even customize your boots to match your taste and your feet. After he has measured you and listened to your style specifications, he will quote you a price.

When I decided to order a pair for myself, I visited a boot maker in Kabul and he quoted me a price. Remembering the custom, I haggled with him over the amount. This particular boot maker seemed to be a pushover. Within a few minutes, I'd knocked the price to less than half the original amount. I stopped bargaining only to avoid punishing him further. I paid and left the shop, chuckling at what a shrewd customer I'd been.

### Poor bargain

Two days later, I returned to collect my boots. They were atrocious. The leather was poor, the fit uncomfortable and the needlework uninspired and shoddy. I complained bitterly. The boot maker shrugged and pointed to the price of 400 afghans (about $7 at the time). Then he pointed to another, superbly crafted pair of boots with a price of 900 afghans.

I immediately understood: You can legitimately bargain for a product that already exists, but you cannot safely bargain for a service yet to be performed. You can name almost any price, but the provider of the service can simply lower his quality to meet your price.

We in DP are like custom boot makers to our end users. If they drive down our estimates for our services too much, we often reduce the quality of our work to match, either deliberately or otherwise. A computer system of low quality is unlikely to be much of a bargain either for our end users or for ourselves.

In obeying the harsh dictates of an unrealistic deadline, a project manager is forced to sacrifice the care and effort that attends the development of a high-quality system. This dilemma is often ignored by DP personnel and end users alike. Indeed, at all levels of DP, an absurd notion holds that only sissies worry about quality, while "real" project managers can develop a system by any arbitrary deadline or for any arbitrary budget amount.

I recently witnessed a disturbing example of the dominance of the deadline. In a large aeronautical engineering shop, a software system was required to operate a complex piece of hardware. Because of poor planning by the general project manager, the software manager had a seemingly impossible deadline for the delivery of his system. Yet he not only succeeded in beating the deadline by a few days — he actually underspent his budget. Pleased, the project manager awarded the software manager a promotion and a large pay increase.

I asked the hardware manager what he thought of the software manager's feat. "That system's one of the worst pieces of garbage I've ever seen," he said. "It's badly designed, hastily coded, almost completely untested and inaccurately documented. I'm far from convinced that it even works correctly in all circumstances."

"Ho hum, just another poor piece of software," you think. "What's so disturbing about that?" What is so disturbing is that this particular piece of software is a component in our national defense system.

> ***"The wrong goals are being set implicitly for the overall good of the department. . . . Ironically, this approach actually increases costs — but in someone else's budget and in another fiscal year."***

Why does a deadline so often take precedence over quality? Why is the cost of system development often considered more important than the quality of the final system, which is admittedly difficult to quantify but not hard to recognize?

### Buy now, suffer later

The answer to these questions is that low-quality systems do not exact their high tolls until they are delivered and put into production. Only then is the horrendous expense of working with and maintaining such systems mainfested.

As a Swiss proverb says, "The bitterness of low quality remains long after the sweetness of low price is forgotten." Indeed, some deadline-constrained systems are so bad that it is cheaper to throw them away and start over.

Although some DP departments partition their budgetary accounting into separate cost areas, with developmental and operational costs charged back to the appropriate systems and departments, few DP shops allocate their maintenance costs correctly. In the worst cases, maintenance charges are made against a monolithic budget; priorities are settled by the user who yells loudest and most often; and no attempt is made to record the maintenance costs of individual systems.

Even in the best cases, where good financial data is available, rarely does anyone take the trouble to relate the cost of the maintenance effort to the quality of the original development work.

In short, the wrong goals are being set implicitly for the overall good of the department. If management tells you to minimize costs and tighten schedules, sadly enough the quickest way to achieve these ends is to lower the quality of the end product. Ironically, this approach actually increases costs — but in someone else's budget and in another fiscal year.

A poster I sometimes see on the walls of junior programmers' offices accurately, if cynically, acknowledges the above budgetary practice. It shows an obviously frantic person surrounded by listings, ringing phones and half-empty coffee cups. The caption reads, "There's no time to do it right, but there's always time to do it over."

### Desperado

Some people make a career of satisfying short-term financial expediencies by delivering products that are on time but of poor quality. The following story describes the quick and dirty deeds of such a deadline desperado.

A contract programmer explained his views of the contract programming business to me. "I always take contracts that last three to six months," he said. "I also try to get jobs where I can code up a storm, hand over my listings right on the deadline, take the money and run. That way, if my programs blow up, I'm well away from the scene of the crime."

I replied that I didn't think it was very professional or even ethical to do a shoddy job and then abscond, leaving bug-ridden code for some ill-fated maintenance programmer to fix up. He countered that I obviously lacked the machismo to be a mercenary in the world of contract programming, with its rewards for meeting deadlines.

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Four years later, I met this same programmer again quite by chance, and I noticed most of his earlier bravado was gone. He confessed that he had been migrating back and forth between California and New York to shake off his acquired reputation for poor work: If a company hired "Sloppy Joe" for three months, it would have to hire someone else for six months to patch his code. New York and Los Angeles, he had discovered, were really small towns in the world of DP.

The DP manager's duty, as Sloppy Joe eventually discovered, is to enforce standards of high quality so that everyone can benefit. Otherwise, everyone suffers sooner or later. In developing a system, of course, time is always an unwelcome pressure, but it's worth convincing management and end users that they shouldn't set an unreasonable deadline, since there will be plenty of time to do the job right if it doesn't have to be done over.

### Unrealistic deadlines

There are four major origins of unrealistic deadlines. In order of increasing justifiability, they derive from wishful thinking, the preliminary project estimates, the creeping commitment and the value step.

**A deadline caused by wishful thinking** is usually based on nothing more scientific than the date by which the end users would like to have their system. Some Mr. Fantasy with enough authority in the organization dreams the impossible dream, and *voila!* a deadline is set. Never be overcome by such a desire to please your end users or your own managers that you acquiesce to this type of deadline.

If a deadline is impossible to achieve, it is also impossible to derive a workable project plan based on that deadline. Therefore, much can be deduced from the project manager's planning chart. In some cases, for example, all a project manager can do is leave the project as a giant monolith on his chart.

In Figure 1, for each task in the plan, the manager allows the shortest time in which that task could conceivably be executed, given ideal circumstances, and then allows no time between the tasks for review, revision or coordination. The result is a deadline that appears to be achievable, although only under the best conditions.

This type of wishful thinking is analogous to establishing that running a mile in four minutes is possible, and then calculating that if a marathon race course is 26 miles, it's therefore possible to run the distance in 105 minutes.

Workers may be able to keep up a breakneck speed for one or two weeks, but they will not be able to sustain such a speed for the whole project. They will tire, and time will be needed for meetings and reviews as well as for carrying out changes to intermediate products. The theoretically possible deadline can't be realized in the real world.

I cannot blame end users and DP managers for wishing that software developments would proceed faster.

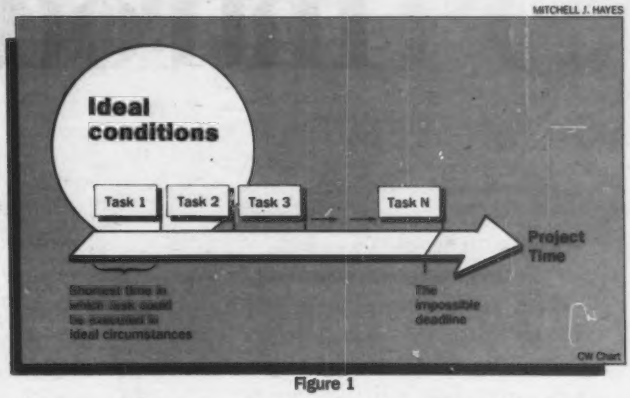


Figure 1

But there are no shortcuts to improving software development speed and productivity. The best ways to do so are to invest time and money in developing staff expertise, standardizing projects and assisting project members.

A second source of unrealistic deadlines is **the preliminary project estimate.** The earlier in the project an estimate is made, the less accurate the estimate is likely to be. A corollary to this rule says the earlier into the project an estimate is made, the more likely it is that someone will enshrine that estimate as a project deadline. Be forewarned: Mentioning a date, especially at the start of a project, with no explanation or cautions, may be regarded as an immutable, realistic goal.

The best procedure when deadlines are mentioned is to refer again to the project plan. This plan, with its dozens of task completion dates, immediately demonstrates the naivete of having a single completion date for a complex project, especially when that date is based upon only a premature estimate.

In addition, the project plan debunks a standard excuse for deadlines: that end users need them in order to prepare for installation. One trouble with a project deadline is that the end users believe they will have the system by that date and make their preparations accordingly.

If the deadline is missed, the users could be trapped between dismantling their old system and not having the new system to replace it. If the end users' needs for installation are integrated into the project plan,

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however, the details can be planned and scheduled fairly accurately as the installation date approaches.

Unrealistic deadlines can also derive from **a process of incremental extortion known as creeping commitment.** A user is fooled into committing to a large and expensive project by a deliberate understatement of the project's size and cost. By the time the user discovers the project's actual cost, he is past the point of no return. If he fails to come up with the extra money required to finish the project, he will lose the money he has already spent.

Obviously, creeping commitment is a devious political trick that must be kept secret from the end users in order for it to work. Often, even the project manager is not informed of the deliberate understatement of the project's cost and receives from his management an unrealistic deadline as a nonnegotiable imperative.

Creeping commitment is an infantile ploy that creates bad feelings between the DP department and the end users once the latter discover they've been duped. The correct way to win end users' commitment to a project is by showing them carefully detailed estimates of project costs and resources. Most end users, faced with an objective statement of reality, will make rational, mature decisions despite DP people's expectations.

**A value step is a change, usually downward, in the value of a system** on a certain date. For example, the federal government may decree that on Jan. 1, all banks shall withhold a certain portion of savers' interest for tax purposes. In this event, an automatic system for withholding interest will clearly be of more value if it is delivered on Dec. 31 than on Jan. 31. The change in the system's value on Jan. 1 is enough to make that date an irresistible candidate for a deadline.

Since a deadline based on the value step has some legitimacy, it cannot be trivially dismissed. It should not, however, be given so much sway that it imperils the conduct of the project or the quality of the project's deliverable goods. There are always alternatives.

In this case, the bank has several options other than the Jan. 1 installation of an automated system, such as persuading the government to delay or revoke its decision, using a cumbersome manual system until the automated system comes up or temporarily defying the rule and paying the subsequent fines.

### Handling unrealistic deadlines

As a project manager, you are primarily responsible for debunking the mythical power of the deadline. If you find yourself saddled by your end users or managers with an impossible deadline, your duty is to minimize their harmful effects in two ways. The first is to protect your project team from destructive pressure; the second is to reflect the pressure caused by the unrealistic deadline back to those responsible for creating it.

To shield your staff from undue budgetary or scheduling pressures imposed on you, your motto should be "The buck stops here." Even if you feel such pressures, don't transmit those pressures to your staff.

Of course, this is a lot easier to say than to do. Being a DP project manager in many companies is like being inside a giant organizational nutcracker, where the pressures from above meet the pressures from below. You are stuck in the middle and would need a very thick shell to hold out in that spot for very long. In that position, many managers capitulate and force their staff members to work long hours, harangue them, blame them and generally give them a rough time in order to meet some arbitrary and impossible deadline.

Most people like to work regular hours the majority of the time, work hard some of the time and slacken off a small portion of the time. Normally, people are neither able nor willing to work in crisis mode indefinitely. A manager's pleading "crisis" too often becomes a poor motivator.

One manager who realized this effect doubled his efforts by circulating a memo: "Since the project is now in emergency mode, we must escalate our work hours until we meet the delivery date." His team did not meet the delivery date, but before the manager could find a more hysterical word than "emergency," many of his team members had asked for transfers.

### Saying no

So what should you do with a ludicrous deadline if you cannot tyrannize your workers and if you yourself don't want to absorb all of the associated pressure? The only sane response for your own mental and physical well-being is to reflect the pressure back to whoever created the unrealistic deadline. That means saying no to your boss or end users whenever you are asked to agree to an unreasonble demand.

> ”
>
> *Being a DP project manager is like being inside a giant nutcracker, where pressures from above meet the pressures from below.*

Say you've been granted 15 months to deliver a computer system that fulfills a certain set of requirements. Because of budgetary problems, your management tells you your revised deadline is 12 months, but the end users want the same system delivered and you'll get no additional staff members. The worst thing you can do at this point is to shrug your shoulders and put everyone on mandatory unpaid overtime. That's bad for team morale, bad for your own morale and bad for management, who must learn to respect reality — not to mention the effect on the quality of work produced.

When you learn of the budgetary cutback, you must look your boss squarely in the eye and say, "Only bank robbers and muggers can get something for nothing by simply demanding it. What features do you want me to cut out of the system?"

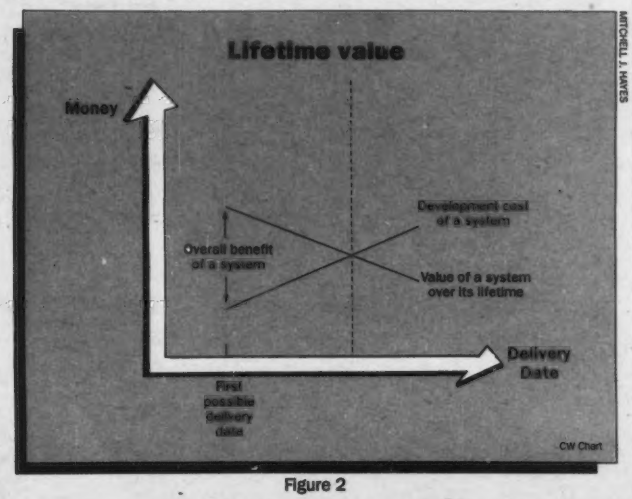


Figure 2

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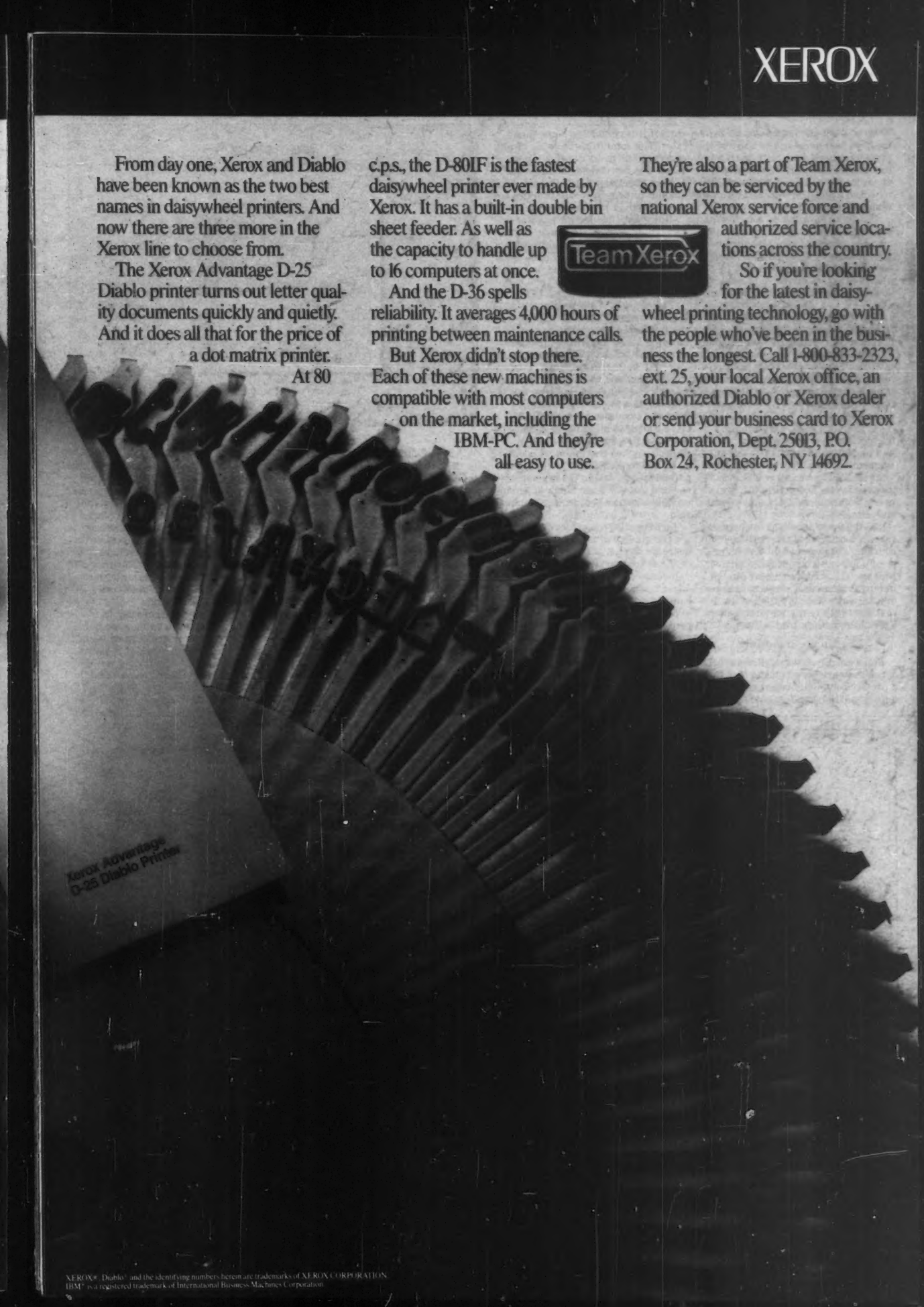


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Then pull out the list of system benefits that you made at the start of the project and put your boss on the spot to make a change. Get your boss to choose what to excise from the system, and negotiate with end users to reach a compromise.

If, after a new list of benefits is developed and a new cost estimate made, the system is not deemed a wise idea, only then can the project be canceled for a good reason. In addition, you won't have to make such an important decision unilaterally.

For whatever reason, if you are forced to accept an unrealistic deadline, consider asking to be reassigned to another project. Whenever one manager I know is in this situation, he says to his boss, "If you think the project can be done in half the time that I estimate, you may be a better person for this job."

At the very least, carefully and unemotionally document your views and underlying reasons to your management and explain the situation to your staff. Otherwise, you stand to lose the respect of your staff, your peers, your management and your end users.

Saying no to bosses or to end users takes a lot of moral strength and courage. But stand firm. The manager of one disastrous project told me that the catastrophe taught him an important lesson: A project manager must always stand up for what's realistic, despite the inevitable managerial inquisition that ensues.

### Legitimate deadlines

Some deadlines are legitimate because they are based on the fact that a project completed before a certain date is worth considerably more than if it is completed some time later. The total lifetime value of any system to its users depends upon when it is delivered. The later the system is delivered, the less the total amount of benefit it will produce for the users over its working life.

However, this decline in total lifetime value is relatively slow. If you deliver a system to its end users in 1985, for example, it may save them $5 million over its lifetime, but the same system delivered in 1986 may save them only $4 million.

The concept of decreasing value is represented in Figure 2. One line in the figure represents the cost of building a system, which increases as a linear function of the time required to build the system. The other shows decreasing value over time.

As these lines indicate, you can't wait forever to deliver a system. Once the two lines in the graph cross, the system costs more than it is worth. However, even when a project reaches that point, canceling it may be foolish, since installing the partial system would presumably cut the end users' losses. Much depends on how near the project is to completion.

Incidentally, the effect of reducing the quality of a system is to decrease the value to the end users of the system over its lifetime. The value may sink because the system doesn't provide many functions, because it's difficult to use, because it's expensive to operate, because it's expensive to maintain or because of any other deficiencies. So, if you opt for lower quality, you are forced to complete the project quickly. You have less room to maneuver; the point where the lines cross approaches very soon.

MITCHELL J. HAYES

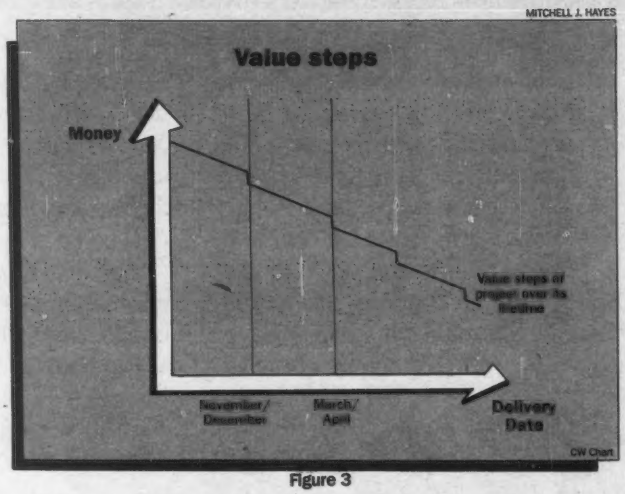



Figure 3

Although it makes little difference in the overall benefit of most systems whether they are delivered one day or the next, there are exceptions.

### Horseshoes and hand grenades

One such system was an automated flood-warning system, dubbed Noah. The automated system would replace a fairly good manual system that consisted of many sensors placed in major rivers and their tributaries. These sensors measured river height, water volume per second, local rainfall and so on. The information from the sensors was used to predict possible flooding and to activate flood gates in the affected areas.

One problem with the manual system was that bad weather made it dangerous to read many of the sensors. Another was timing: Humans had trouble interpreting all the rain and river data in time to do anything useful.

The manual system typically provided four to six hours' warning to open certain flood gates and to evacuate designated areas. With the automated system, the information would be fed into a computer for quick analysis and then would give an expected eight to 12 hours' notice.

In the region of the country where Noah was to be installed, there were two primary flood seasons: one in November and December and the second in March and April. To gain the most benefit from the system, a deadline for installation of Nov. 1 was set. The project team installed the hardware by mid-October, had the hardware and software talking to each other during the last week of October and delivered the system on Nov. 1 as planned.

### Natural test case

Unfortunately, there was no time to test it, except for the most straightforward test cases. About a month later, Mother Nature provided a boundary value test case by dumping three to five inches of rain in one day on the district covered by the sensors.

The system performed magnificently, indicating to the authorities which areas should be evacuated and when and advising the authorities to open the gates on river A to allow water to run off via river B. The authorities carried out the system's instructions with alacrity.

The first indication that something was amiss came from an old man who had lived his whole life on the banks of river B. He telephoned to say that the river was rising about a foot an hour and was already spilling over its levees in several places. He added that everything had been OK until "some darn fool opened the gates upriver." Fortunately, not much damage was done. The greatest expense was the evacuation of hundreds of families from areas untouched by floodwaters.

As you may have guessed, the system was close to being done but not quite close enough. The cause of the erroneous advice lay in program bugs. But these were bugs of the worst kind: They gave reasonable data that was dead wrong. The end users didn't trust the system fully for several more years, during which time a parallel manual system was also operated. How much money the automated system has cost the end users is not on record.

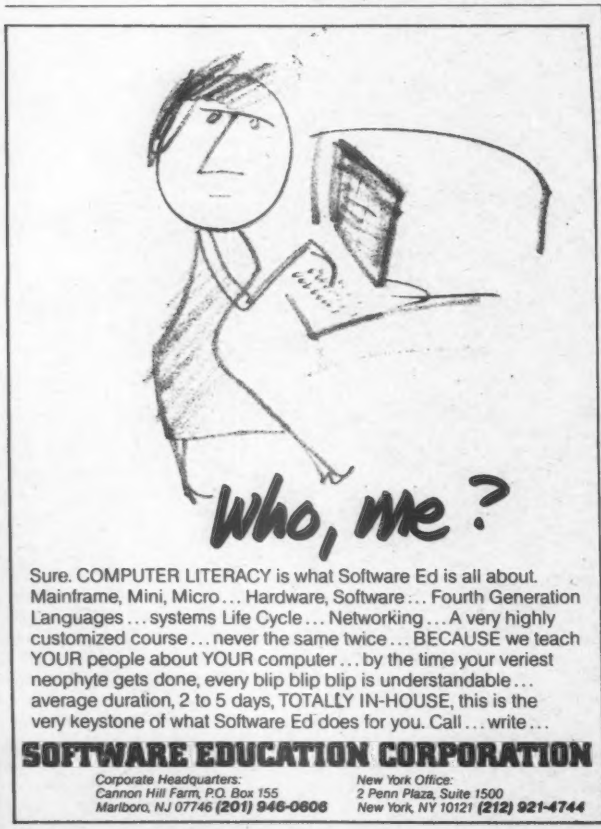
The value of this type of system can't be represented by a straight line, since the value falls sharply each year between the two flood seasons (Figure 3). But even in this case, setting any one of the steps on the value line as a deadline may prove to be a false goal. As always, the cost of a poor-quality system far exceeds the benefit of installing it before the apparent deadline of the flood season.

### A compromise strategy

When such steps in the value line of a system occur, is there some way to take advantage of them without jeopardizing the quality and, hence, the benefits of the system? There is, since most systems are composed of subsystems that each have their own value and cost lines.

Implementing only part of a system is often a good way to avoid the full loss of system value on a certain date. If you identify a date as a possible deadline, first ascertain whether there is any significant advantage to delivering the system on or before that date. If there is an advantage, then determine the minimum portion of the system that can be implemented to accrue the maximum benefit.

Finally, plan a strategy whereby you can deliver the needed piece by the crucial date with the least possible risk to the project and to the final system. Four strategies can help develop the requisite pieces in time: incremental implementation, radical

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development, throwaway code and prototyping.

### Incremental implementation

Incremental implementation simply means constructing a system gradually in pieces. First, a small working portion of the system is implemented; then the other pieces are added to the working portion, one by one, until the system is complete. Throughout its implementation, the system operates, and its functionality increases as pieces are added. Some versions of the growing system may even be useful enough to deliver to the end users.

To illustrate how you could exploit incremental implementation to deliver certain functions by a given date, let's return to the flood warning system. As the project manager, you might propose this as a feasible schedule:

Oct. 5 — Install rain gauges.

Oct. 17 — Install river sensors.

Oct. 20 — Connect gauges and sensors to the computer.

Oct. 25 — Add software to read and control gauges and sensors (call this subsystem one).

Nov. 5 — Conduct acceptance test of subsystem one.

Nov. 8 — Add software to predict flooding from river flow data (subsystem two).

Nov. 30 — Add software to predict river flow from rainfall (subsystem three).

Jan. 8 — Add software to compute best flood-relief tactics (subsystem four).

> ***Once the code is up and running, people tend to gloss over how bad it is in order to push on with the next pressing problem. . . . The only right way to install throwaway code is to have a plan that dictates how to develop its replacement and when to discard it.***

May 15 — Conduct acceptance tests of subsystems two, three and four.

This is not an ambitious schedule. By the beginning of the November/December flood season, only subsystem one is installed and tested.

In practice, each piece of software is not added all at once. Small pieces of code are added incrementally to the test system under a plan derived from the software design. In this way, system testing proceeds constantly on the gradually growing system.

Although this first piece of software is limited, it provides some advantages over the manual system. Much more data can be captured without personal risk, and the data can be continually checked for plausibility against some sample manual data.

While adding software subsystems two, three and four individually to the system, the project team tests them as thoroughly as possible. The objective of this testing is to detect errors in the design and programming of the software.

Acceptance testing doesn't take place until May 15, when a large amount of data can be compared with the actual fluctuations of the rivers over the period. In a system such as this one, the ultimate test of the acceptability of the system is whether its predictions are confirmed by reality.

This incremented implementation of the completed system doesn't seek to deliver as much software as possible, tested or not, by a certain deadline. Instead, it aims to deliver a system worth having, with some working parts in place at the beginning of flood season, even though the system cannot be accepted as reliable in its entirety until May at the earliest.

### Radical development strategy

A second strategy to meet a deadline is radical development, which involves designing and implementing parts of a system without having completed the analysis of the whole system.

Radical development is a risky way to develop a system, because the analysis of the final portions of the system might require design and/or programming changes to the software already installed. Redoing work can be expensive.

There are three criteria for choosing when to use radical development:

- If there are functional pieces of the system that can be analyzed, designed and implemented reasonably by a certain date.
- If implementing those pieces of the system by that date brings substantial material gain.
- If enough analysis (in addition to that for the pieces being implemented) can be completed to minimize radical development because the method chosen is extremely difficult to manage and tends to reduce the quality of the system that is produced.

### Other deadline strategies

Throwaway code is a third alternative: simply lash together some quick and dirty code as a temporary measure. This code could lack some desirable qualities, such as maintainability, but it must be correct. Of course, you should write as little of the dirty code as it takes to do the job, because this code will be replaced eventually by properly constructed code.

Prototyping, the fourth strategy, is similar to throwaway code as a solution to meeting deadlines in that it produces a temporary system. Prototypes are constructed from high-level languages, from data base query languages or by means of an application generator.

Such a system usually cannot be operated in production indefinitely because it may suffer from machine

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inefficiency, awkward dialogue, inconsistency with interfacing subsystems or poor long-term maintainability.

The third strategy, and the fourth to a lesser extent, need to be used with caution since each involves throwing something away. Unfortunately, "temporary" has a way of becoming "permanent," as in Europe, for instance, where temporary housing built shortly after World War II is still occupied.

It's the same way with code. Once the code is up and running, people tend to gloss over how bad it is in order to push on with the next pressing problem. The quick and dirty code becomes older and dirtier and becomes someone's nightmare in perpetuity. The only right way to install throwaway code is to have a plan that dictates how to develop its replacement and when to discard it.

### Big risk, small payoff

The deadliness of deadlines takes effect in three ways: by destroying the project manager's control of his project; by ruining the quality of the project's deliverables; and by demotivating project staff.

But professionals continue to believe in the magical quality of deadlines. A talk that I once gave on abolishing deadlines was followed by silence punctuated by nervous shuffling of feet and embarrassed coughing. After all, I'd just proposed to demolish the one abiding custom for managers in this ever-changing world.

Eventually, a question was voiced: "Haven't you heard of Parkinson's Law, which states that work expands to fill the time available? If you take away the deadline, the project team will lose all incentive to work, and the project will go on forever."

In advocating the removal of monolithic deadlines, I'm certainly not proposing to remove every deadline and thus have every project expand infinitely. Nor do I recommend that a project be allowed to continue indefinitely in the futile promise of some forthcoming gem of perfection. A project must be conducted under the firm regimen of a project plan, with the staff completing tasks on time. If schedules for tasks slip, you must know the reasons why. If the reasons are valid and the delays unavoidable, let the schedule slip.

Obviously, you should try to minimize such slippage as much as you can. Since you shouldn't run a project like a leisure resort for team members, you're certainly justified in applying extra pressure occasionally to get the job done. But to take the rigid line that no project slippage beyond the deadline is permissible under any circumstances is ridiculous. You cannot simply ignore perturbing factors that change the project plan, and such managerial inflexibility results only in casualties to your project team and to the project itself.

Meeting a deadline for its own sake is often a gamble, with quality as the stake and precious little as the payoff. One of my seminar attendees put it well when she said, "After a few months, nobody remembers whether you made the deadline or not. But if you turn out a bad system, you get a phone call three times a week forever from somebody who's mad at you." Or as Thomas Jefferson said, "Delay is preferable to error."


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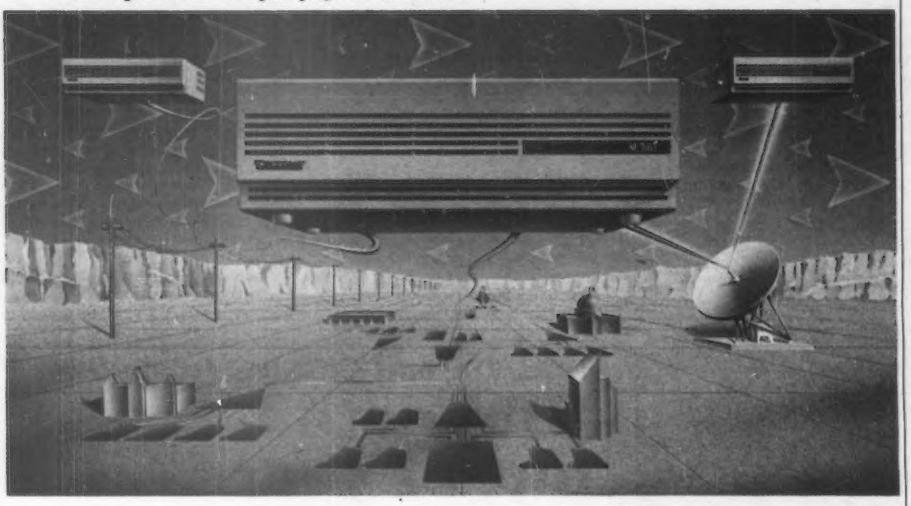

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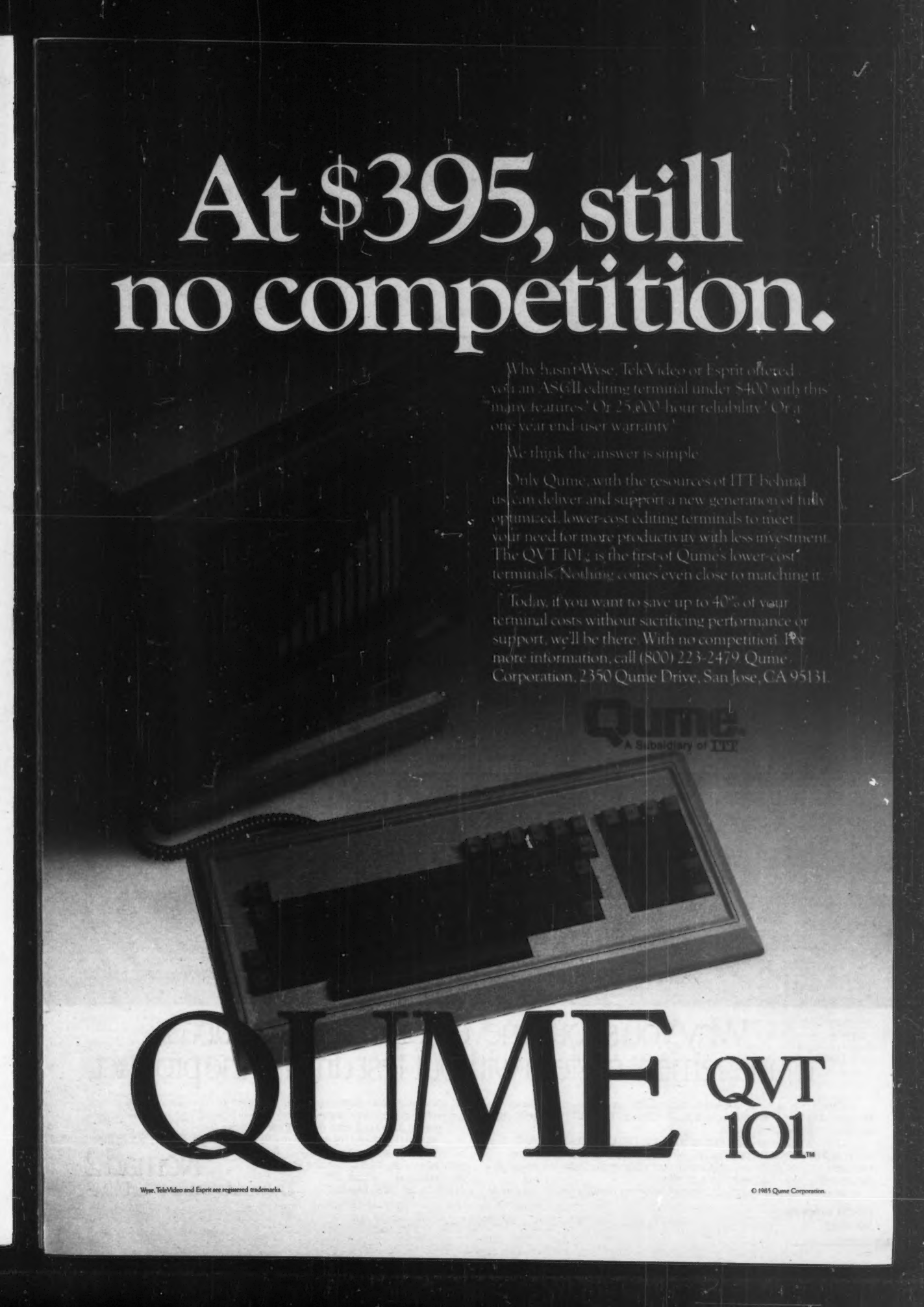

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IN DEPTH

# RJE REACHES FOR THE UPPER HAND

PHOTO BY P. CHARLES LADOUCEUR

By Isaac Kong

*3270 communications are in vogue among end users needing access to mainframe data. As DP management becomes more involved in the selection of links, solutions involving remote job entry may come out on top.*

Micro-to-mainframe communications is a hot topic among end users throughout the industry these days. It is also an area gaining increased attention from data processing and MIS management, whether by choice or by "force" through rising end-user demand.

Newcomers to the field will quickly notice that in those installations where remote personal computers have already been linked to host systems, 3270 communications is the preferred method so far. In fact, the marketplace is currently bursting at the seams with emulation products that promise to turn the lonely personal computer into a communicating, file-transferring 3270 terminal stand-in.

To DP managers who have retained some perspective, it may seem strange that 3270 communications have gained an upper hand over remote job entry (RJE), the method originally developed by IBM to transfer bulk files between a host system and a remote device. Most people familiar with data communications from the mainframe end would agree that RJE is more efficient than the interactive 3270 protocol for file transfer applications.

So why has 3270 prevailed? A number of reasons apply, but most of them stem from the fact that the end-user community is most familiar with data communications from the terminal end. To date, the implementation of micro-to-mainframe communications have been driven by the end-user community, not by the DP shops, and historically, end users have preferred 3270. But by so doing, the most efficient way to transfer files has been somewhat neglected.

This situation is about to change, however. DP centers have always chosen RJE to transfer large amounts of data. As DP managers become more involved in evaluating and selecting micro-to-mainframe communications products, the tide is likely to shift toward RJE-implemented solutions. As increasingly sophisticated micro-to-mainframe applications are developed, RJE's advantages should become more evident.

Personal computer users currently prefer 3270 communications because so many of them are familiar with the protocol, having used 3270 terminals in the past for mainframe access. As long as current emulation products simply "turn a personal computer into a 3270 terminal" as the advertising says, there would seem to be no reason to change protocols.

However, there are good reasons to consider change. Micro-to-mainframe communications is an evolving applications area. The simple 3270 emulator is rapidly being replaced by micro-to-mainframe links that integrate the emulation function into the personal computer application itself. With these links, the actual communications process is transparent to the end user, who only interacts with his personal computer applications program.

### Factors no longer apply

Thus, the primary factor for choosing the 3270 protocol — the fact that the user is familiar with the process — no longer applies. Once micro-to-mainframe communications become a user-transparent feature of the application, network implementers and designers will be free to use the most efficient file transfer mechanism available: RJE.

After all, the 3270 protocol was developed by IBM for on-line, interactive inquiries by a dumb terminal. Personal computers, of course, are intelligent devices that should not be demoted to dumb devices. Furthermore, if a micro application requires mainframe data, it typically needs to receive complete files, whereas 3270 communications were developed to send single pieces of information in answer to simple inquiries.

The historical context that has shaped the current evolutionary stage of personal computer communications illustrates the point even more clearly.

The 3270 protocol was initially designed by IBM for on-line, interactive mainframe communications with nonintelligent terminal devices. Local 3278 or 3279 terminals were hard-wired to the mainframe

---

*Isaac Kong is president of Network Software Associates, Inc. in Irvine, Calif. In 1977 he became the first to implement SNA communications outside of IBM.*

via a special controller. In addition, 3270 terminal clusters could be installed in remote locations and query the mainframe over telecommunications links.

### Needed: more data

As users began expanding the applications for 3270 communications, requiring the transmission of greater amounts of data, the 3270 data stream proved inadequate to handle the increased requirements. Therefore, IBM gradually enhanced the data stream and eventually bypassed it altogether with a new 3270 feature called Structured Fields.

> *The 3270 protocol was deemed the solution to mainframe access needs — never mind that it was grossly inefficient at transferring large files.*

This feature lifted the limitations on how many control characters could be embedded in the data. A special character signaled that the characters that followed were more control characters, not data. Thus the terminal gained more control over the data it received and could operate more efficiently.

However, most 3270 emulators available today for personal computers do not use Structured Fields. They rely on the 3270 data stream to transfer files, which is something the protocol was never designed to do.

Moreover, to use the 3270 protocol at all for bulk data transfer, a separate mainframe program product must be purchased to run under CICS or TSO. Such software products are not part of the standard package. They are available from IBM and other suppliers, but incompatibility problems can arise with some of these outside alternatives.

### The Personal Computer

When IBM developed the Personal Computer, it was a totally end-user-oriented product from the very start. It was even designed by an end-user-oriented development group in a totally new division — the Entry Systems Division (ESD).

Once the Personal Computer gained widespread acceptance by the end-user community and these end users began demanding access to centralized mainframe data, it is not surprising that 3270 communications was what came to mind first.

It should be noted that IBM offered both RJE and 3270 emulation for the Personal Computer. However, due to prior familiarity, 3270 was embraced by the end-user community, while RJE was not. The 3270 protocol was deemed the perfect solution to end users' mainframe access needs — never mind that it was grossly inefficient at transferring large files.

RJE, on the other hand, was designed by IBM to do exactly what most users really want from a micro-to-mainframe link: bulk data transfers.

The obstacle to RJE's acceptance at that point was a lack of visibility. After all, RJE was something that belonged in the domain of the DP department. Even though RJE was available for the Personal Computer, end users did not understand its benefits and opted for a 3270 solution.

To understand the underlying superiority of RJE, one needs to trace some additional history. In the early days of mainframe computers, all I/O to and from the mainframe was accomplished via punched cards and printer output. The system software drivers for card readers, card punchers, printers and so on were very slow because a lot of processing had to be done "on the fly."

### System changes

Under the OS mainframe operating system, the Hasp subsystem was developed to spool these card and print images onto disk and thereby speed up the entire I/O process.

As an alternate solution to the I/O bottleneck, the Asymmetric Multiprocessing System (ASP) was developed to couple two or more mainframes together. One handled the I/O functions while the other or others handled the "number crunching."

OS underwent a number of

HOW TO MAKE A GREAT IMPRESSION AT THE OFFICE

> ***Under RJE, IBM provides everything required to implement the link from the mainframe side. A complete set of systems utilities enable the host to read files from a remote personal computer or to write files out to the remote device.***

changes and ultimately gave rise to the MVS operating system. Under MVS, Hasp evolved into a new product called JES2, while ASP evolved into JES3. Both expanded the concept of off-loading mainframe I/O functions.

In contrast to Hasp, which was a separate subsystem, JES2 and JES3 were integrated into MVS itself, taking over some of the system tasks normally performed by the operating system.

Under IBM's other mainframe operating system, DOS, the Power subsystem was developed to provide JES-like functions on DOS systems.

With the later introduction of IBM's Systems Network Architecture (SNA) and IBM's implementation thereof, called Vtam, support was provided for the remote entry of jobs, appropriately dubbed RJE by IBM. The concept of I/O off-loading had now spread to incorporate remote I/O devices.

RJE was initially used by such remote devices as the IBM 2780, the IBM 3780 and the IBM 3770, which were bulk card- and report-transfer devices. These terminals used RJE to communicate with JES2 or JES3 (under MVS) or with Power (under DOS).

Later, RJE was further enhanced to minimize transmission time. IBM added other features such as data compression and compaction to RJE, greatly increasing overall transmission throughput.

The net effect of this evolutionary process is that RJE has as its roots a batch process, not an interactive one, since the transfer of bulk files is a batch operation. It is important to understand that IBM essentially had two parallel evolving "product lines," 3270 for interactive applications and RJE for bulk transmissions.

Via JES2, JES3 or Power, bulk files can now be transferred from a remote personal computer to the host or vice versa. The personal computer must, of course, be equipped with an emulation package so that it appears to the host as a standard RJE workstation, just as a personal computer must emulate a 3270 device for 3270 communications.

An important difference is that under RJE, IBM provides everything required to implement the link from the mainframe side. A complete set of systems utilities enable the host to read files from a remote personal computer or to write files out to the remote device. One example is the Iebgener utility, which will move a file from source to destination.

These utilities are available as standard features in most IBM mainframe installations. Under MVS, JES2 itself is a standard feature of the operating system, not an option. The 3270 file transfer requires optional program products on the host.

### Mini-to-mainframe

It is interesting to note that in the area of minicomputer-to-mainframe communications, RJE solutions are more often used. IBM's 8100 and 4300 series, Series/1 and System/34, 36 and 38 are all set up to use RJE for mainframe communications tasks.

Within IBM, minicomputers fall under the Systems Products Division, which never has been allowed the freedom or entreprenurial orientation found in the heyday of ESD. ESD was allowed to go in its own direction, and hence the Personal Computer (and the third-party products developed for it) was driven by end-user demands rather than DP management demands or, for that matter, Big Blue's guiding hand.

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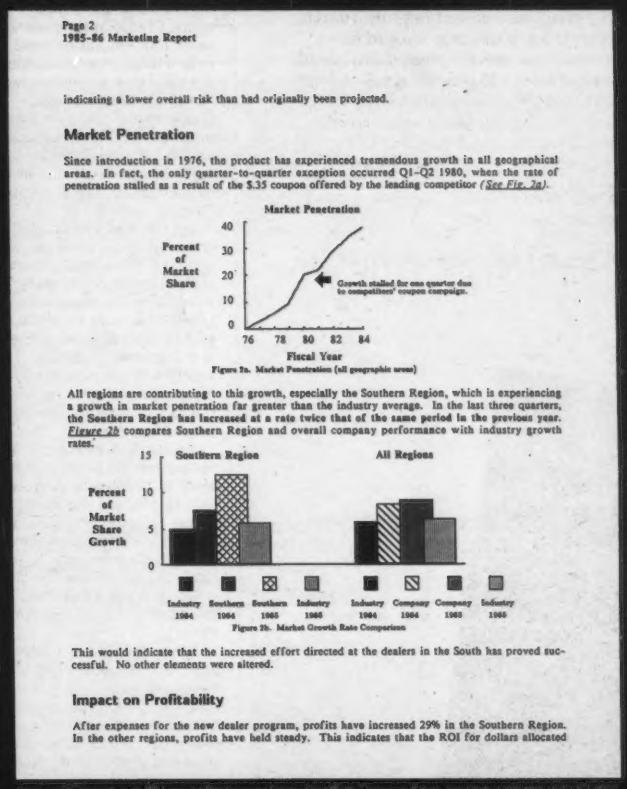
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1985-86 Marketing Report

indicating a lower overall risk than had originally been projected.

Market Penetration

Since introduction in 1976, the product has experienced tremendous growth in all geographical areas. In fact, the only quarter-to-quarter exception occurred Q1-Q2 1980, when the rate of penetration stalled as a result of the $.35 coupon offered by the leading competitor (See Fig. 2a).

Market Penetration
Percent of Market Share
40
30
20
10
0
Growth stalled for one quarter due to competitors' coupon campaign.
76 78 80 82 84
Fiscal Year
Figure 2a. Market Penetration (all geographic areas)

All regions are contributing to this growth, especially the Southern Region, which is experiencing a growth in market penetration far greater than the industry average. In the last three quarters, the Southern Region has increased at a rate twice that of the same period in the previous year. Figure 2b compares Southern Region and overall company performance with industry growth rates.

Southern Region
All Regions
Percent of Market Share Growth
15
10
5
0
Industry 1984
Southern 1984
Southern 1985
Industry 1985
Industry 1984
Company 1984
Company 1985
Industry 1985
Figure 2b. Market Growth Rate Comparison

This would indicate that the increased effort directed at the dealers in the South has proved successful. No other elements were altered.

Impact on Profitability

After expenses for the new dealer program, profits have increased 29% in the Southern Region. In the other regions, profits have held steady. This indicates that the ROI for dollars allocated

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Therefore, minicomputers tend to communicate with the host via the RJE protocol that management prefers, while personal computers often use the 3270 protocol that end users demand.

As the Personal Computer family becomes more powerful and continues to take over applications traditionally reserved for minicomputers, it will increasingly take on a minicomputer's functions and characteristics. These traits include the minicomputer's method of communicating with a host installation, implying once again an overall swing toward RJE.

> *More RJE emulation products will become available as micro-to-mainframe applications become more powerful and as DP departments take a more aggressive role in the evaluation and selection process.*

An important related development affecting the future of micro-to-mainframe communications lies in IBM's introduction of Logical Unit 6.2 (LU6.2). This SNA feature has received much press attention lately, but in terms of solving today's problems, it is not yet a viable alternative.

The LU6.2 specifications include the capability for a very high level of integration between the personal computer and the host in a micro-to-mainframe link. With LU6.2, a personal computer program will be able to exchange information with a host by updating or extracting only those data elements that are needed. Thus, the applications will no longer require complete file transfers.

Today, however, LU6.2 is only a pipeline between the host and the personal computer. The program products needed on each end of the pipeline to drive the extraction process are not yet available. Therefore, while DP management needs to plan toward LU6.2 solutions, all the pieces are not yet in place. Most industry experts predict that such program products are some time away from being generally available.

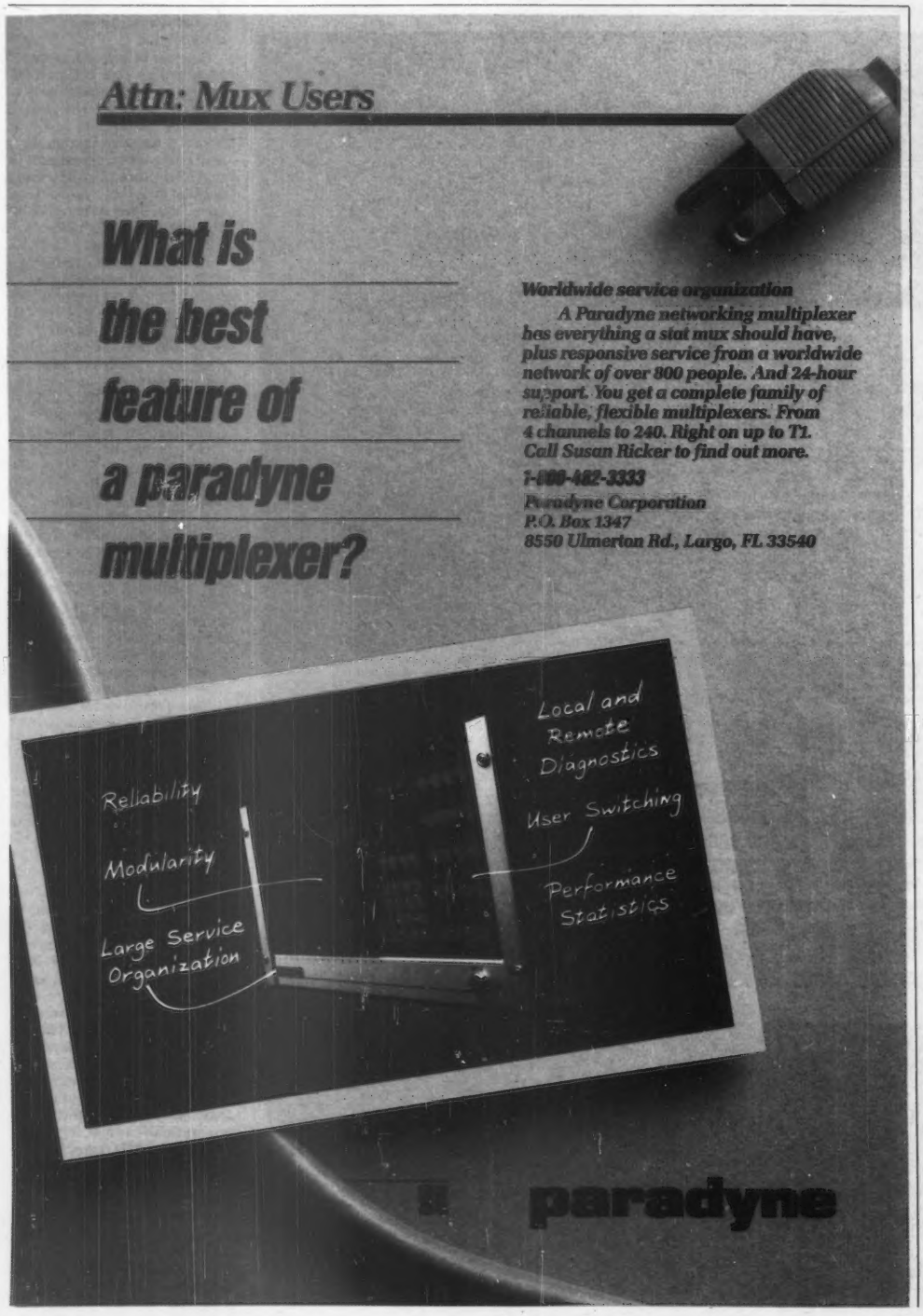
### RJE solutions

In meeting today's challenges, then, it appears that DP management will increasingly look toward RJE solutions. Predictably, more and more RJE emulation products will become available for the Personal Computer family, as micro-to-mainframe applications become more powerful and complete and as DP departments take a more aggressive role in the evaluation and selection process.

As the awareness level concerning the need for more efficient file transfer capabilities continues to rise, vendors will undoubtedly develop ever more sophisticated RJE packages for personal computers. And this surely will help the personal computer live up to its potential as a powerful distributed processing machine.

Under RJE, personal computers remain peers in a network of intelligent devices, able to off-load the mainframe effectively. They are not reduced to merely emulated dumb terminals, contributing to the workload of the host while delivering little if any network functionality.

When this last evolutionary step occurs, the personal computer will finally become an organizational productivity tool in addition to its already proven abilities as a personal productivity tool.



# Special Report

Computerworld
September 30, 1985

# Minis and Small Business Systems

## Off-the-shelf technology catches on

CW PHOTO BY O'CONNELL/ADOLCELR

*Inside:*

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*Ready-made components and miniaturization reshape the mini classics*

*SR/10*
*Design trends: multiple and parallel processing*

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*Buying a mid-range business system*

Special Report

# Minicomputers adapting to users' needs

## Size, ready-made components key to success

By Tom Henkel
Special to CW‡

Minicomputers have proven to be about as adaptable as the cockroach when it comes to surviving in a sometimes hostile environment. Said to have been bordering on extinction for at least five years now, minicomputers — even some of the traditional 16-bit variety — continue to thrive.

Perhaps two of the best examples of the ability of minicomputers to survive are the top-selling versions of the 16-bit genre of systems — IBM's Series/1 and Digital Equipment Corp.'s PDP-11 series. Both systems, still being manufactured, have been around for nearly 15 years. But a side-by-side comparison of the original PDP-11 and Series/1 models with those currently available from DEC and IBM would reveal that, from a design standpoint, the name tags are probably the only thing the machines have in common.

Miniaturization has allowed both IBM and DEC to reduce the size of the systems. Furthermore, both companies have been able to consolidate what used to occupy several CPU boards down to one CPU chip. Consequently, each manufacturer has been able to develop modern systems that take advantage of nearly 15 years' worth of software development and specialized peripherals.

### Moving toward compatibility

A closer look at current minicomputer architectures will also reveal that vendors are placing more emphasis on compatibility with industry standards. Minicomputers grew out of the days when manufacturers strove to design unique system architectures that tended to lock the user into one product line. Today, most small systems manufacturers push for compatibility with as many industry standards as possible and try to use off-the-shelf components when possible.

While any salesman worth his salt will tell you this change was brought about by the vendor's concern for the user's migration path, the underlying reason is largely economic.

The research and development and manufacturing costs associated with a system using a unique CPU and operating system are prohibitive for most manufacturers — especially small systems makers concerned with keeping production costs to a minimum. However, the use of off-the-shelf components has become popular with larger manufacturers as well. Larger companies appear to be funneling development money for enhancement of larger systems, while acting, in essence, as systems integrators on smaller units. Again, this approach keeps development costs low, and the vendor can use the benefits of volume components purchases to reduce end-user costs. Basically, small systems have become a commodity to many manufacturers.

IBM, for example, has used this technique on the Personal Computer. There is little in the Personal Computer, other than IBM's expert marketing talent, that is homegrown. IBM instead has channeled its R&D efforts to larger, potentially more profitable projects such as the 3090 series of mainframes announced this past February. Burroughs Corp. has employed a similar technique. In the past year, Burroughs has staged an internally driven redevelopment of its upper end systems by announcing the A 3, A 9 and A 15 series of processors. But it relies heavily on Convergent Technologies, Inc. for its low-end systems.

This trend toward off-the-shelf components has, in a way, left minicomputer development in the dust. Microprocessors are so inexpensive, and lately, with powerful products like Motorola Corp.'s 68020 and National Semiconductor Corp.'s 32032, the need to stage an internal development at the low and mid range has become less profitable and therefore less desirable. But the trend has also opened a window for start-up companies.

Clearly, if IBM can buy microprocessors from Intel Corp., any number of smaller companies can do the same. Consequently, any successful small system produced by a major vendor is quickly followed by a slew of look-alikes from smaller companies. The end result seems to be a boom-or-bust sort of industry where in a relatively short time, perhaps a two- or three-year period, a product is announced, becomes successful and breeds a string of start-up companies making look-alike products. The market then becomes saturated with a given type of product and sales decline, forcing many companies out of business.

*Henkel is a senior researcher at the Yankee Group, a Boston-based market research firm.*

## What is a minicomputer?

The vague definition of "minicomputer" confuses any discussion of the machine's long-term survivability. Machines employing 16-bit architectures, such as the Digital Equipment Corp. PDP-11 and the IBM Series/1, appear to have have been pushed into the background by a newer class of 32-bit small systems.

Supermicrocomputers, as they have been dubbed, have become very popular for the departmental and specialized business applications that gave rise to the minicomputer in the first place. The question is whether these 32-bit systems are outgrowths of the desktop microcomputer or improved minicomputers.

To the user, this question is largely academic. The need for departmental and desktop systems is clearly stronger now than a dozen or so years ago when minicomputers first started to make their mark on the computer industry. Whether the system can be classified as a minicomputer or a microcomputer should make little difference to the user.

The key goal should be to find a machine that meets the current user's demands, while offering some degree of upgradability for future needs.

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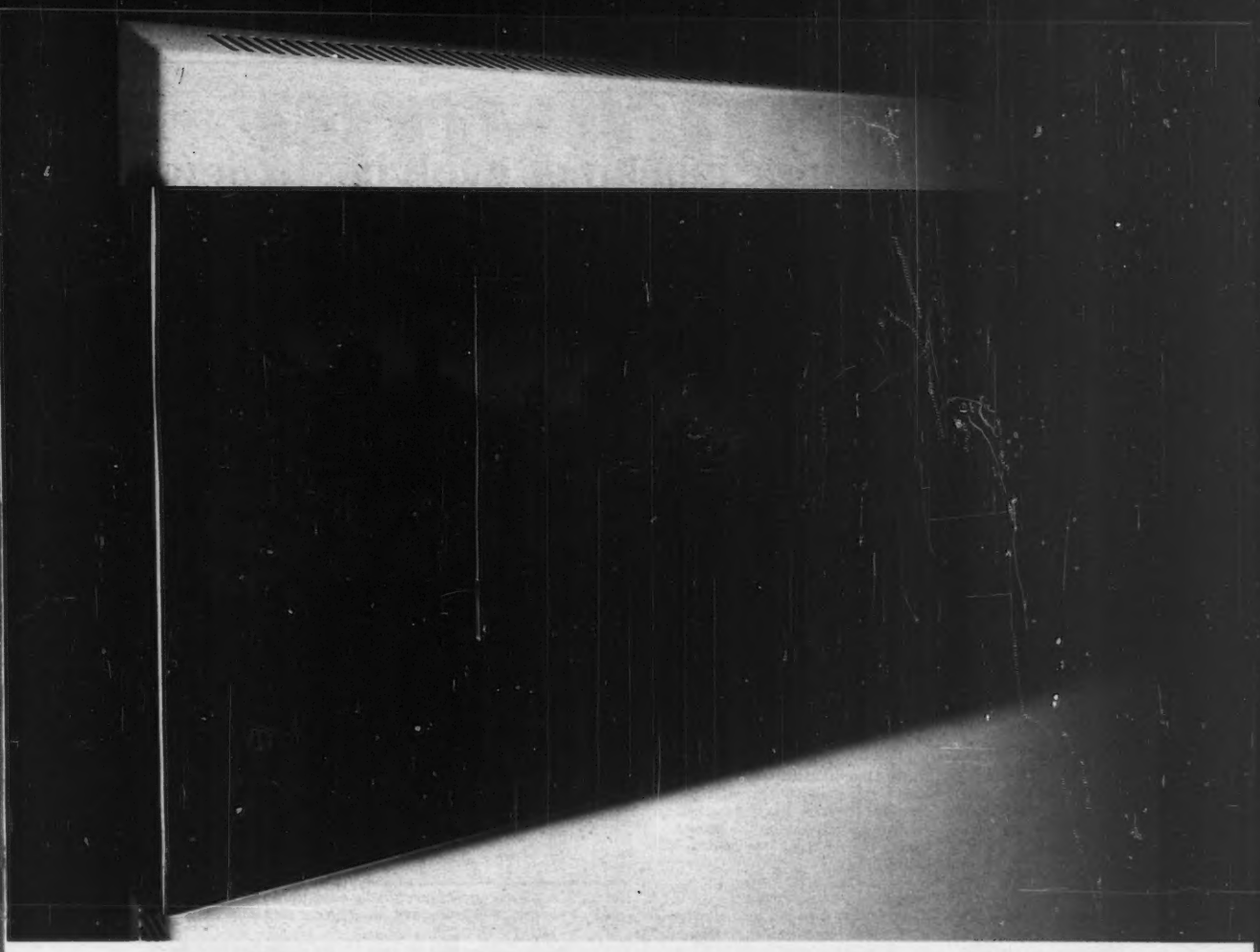

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Special Report

# Superminis: Dynamic machines evolving to new uses

## Moving into OA, distributed DP areas

By James Connolly

No one can say with certainty who coined the word "superminicomputer" and to what systems he meant it to apply, but a consensus is emerging that a supermini is nothing more than a minicomputer — a high-end mini, but a mini nonetheless.

A 32-bit architecture was a key qualification for supermini status back around 1977, when companies such as Digital Equipment Corp., Prime Computer, Inc. and Data General Corp. were introducing their first superminis. That architecture gave superminis more than twice the processing power of 12-bit and 16-bit machines.

"But supermini classification isn't a discontinuous event, just the high end of the market. It's a continuous process," according to Peter G. Jessel, director of business group planning for DG.

**'Permeate the entire spectrum'**

"If you were to use the 32-bit standard as the definition for a supermini today," he said, "it would permeate the entire spectrum of computers, from $10,000 to $300,000 or $400,000."

The supermini field — the world of high-end minicomputers — touches on the 32-bit supermicro class at its low end and reaches up toward the IBM mainframe world at the top. It is a constantly changing area. Supermini vendors have taken the lead, for example, in breaking out with new technologies such as parallel processing.

The market remains dynamic, despite the onset of industrywide consolidation, with new vendors introducing new systems and with superminis shifting away from their roots in the scientific and engineering fields and toward a future in office automation and distributed processing.

Office automation applications are the fastest growing in the superminicomputer field, according to a recent report by International Data Corp. (IDC), a Framingham, Mass., research firm. The IDC report, "Supermini User Software Trends: Past, Present and Future," said 21% of the supermini sites surveyed supported some type of integrated office automation in 1984. IDC expects that figure to rise to 40% by the end of 1985.

**Accounting applications most common**

In the study, IDC also found that the most commonly mentioned application running on superminis was accounting — cited by 20% of the respondents — followed by software development, word processing and industry-specific applications.

Most respondents also reported that they ran data base management packages on their superminis. The report noted that the spread of those packages may be the result of a trend toward bundling the software with the machines. Scientific and engineering programs, a prime market for the early superminis, were mentioned by only 10% of the respondents.

"Over the past few years the supermini market has pushed beyond its traditional boundaries," the report stated. "At one time, superminis were predominantly found in scientific environments; today, they also have a strong presence in the corporate world. With their increased power and flexibility, superminis are taking on the general business applications once handled by mainframes or minicomputers."

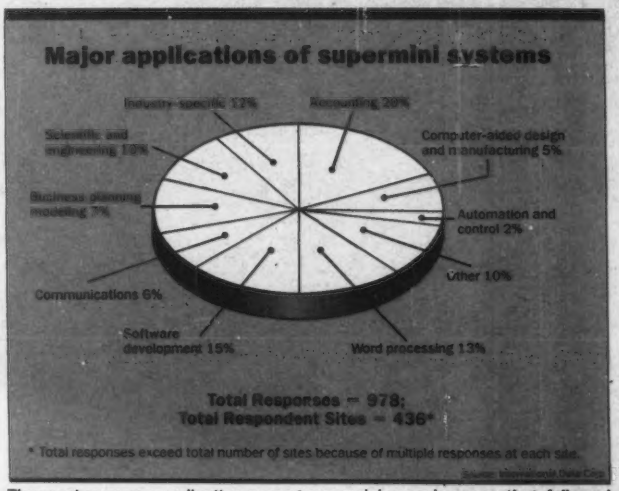
Jessel concurred that the supermini is no longer considered a strictly scientific or engineering machine. Examining DG's own plans, he said the three hot markets for superminis are distributed data processing, office automation and engineering. Even when a supermini is used as a high-performance workstation for engineers, he said, it runs office automation packages that support applications such as electronic mail and electronic calendars.

DG sees the distributed data processing and office automation fields as areas where companies can install superminis on local-area networks. Jessel said the superminis would act as file servers and host processors, with much of the processing power migrated to intelligent terminals and personal computers out on the network.

He compared that type of network, not yet common in the commercial data processing market, to the kind of networks technical users have relied on throughout the 1980s; engineers have been running complex calculations and simulations on supermini hosts while handling most of their preliminary work and input at the terminal level. Jessel added that many engineers still do not have high-performance intelligent workstations, which leaves a market open for companies like his.

Jessel parted ways with the IDC report, however, on the future of superminis as replacements for corporate mainframes. He conceded the large, centralized data base to the IBM world and said companies such as DG have their greatest potential where an organization can be defined hierarchically, with depart-

See JESSEL SR/10




**The most common application among supermini users is accounting, followed closely by software development, word processing and industry-specific tasks.**

## Superminicomputers carve strong niche in 32-bit arena

The supermini — a 32-bit creature originally designed to fit someplace between a mainframe and a minicomputer — has evolved to fill a slot all its own.

According to Peter G. Jessel, director of business group planning for Data General Corp., the supermini, like so many other computer products, was the result of a search for computing power, speed and flexibility.

Jessel was once an engineer for Digital Equipment Corp., an early player in the supermini market with Data General and Prime Computer, Inc. He recalled how the supermini snuck in between the mini and mainframe.

He pointed to the 1960s, when DEC's PDP-8 and Data General's Nova family of minicomputers were introduced.

"Interestingly, one of the things the minicomputer brought to the industry was approachability. In the early 1960s, you couldn't even touch a computer unless you had one of the few keys to the computer room," Jessel said. He went on to say that at MIT the computer was on a floor where the elevator didn't even stop. "When the PDP and Nova came out, these were machines that people could touch. The IBM world at that time was mostly batch, and beginning with the minicomputers people started dealing with more and more interactive computers," Jessel noted.

But those early minicomputers began to "run out of gas" as people used them more and more, and the required tasks got too large for the systems' finite memory spaces, Jessel added.

The memory demands led to development of the 32-bit supermini computer in the mid-1970s, which was a natural evolution, according to Jessel.

Those early superminicomputers took the place at the top of the minicomputer scale (in price, performance and popularity) of machines such as the DEC PDP-11 and DG's Nova, fitting into the $100,000 to $150,000 price slot. In the years that followed, however, those early superminicomputers were driven down and sometimes off the scale by newer products that took over the top spot as the evolution continued.

Meanwhile, the more traditional minicomputer such as the 16-bit DEC PDP-11 is far from dead, according to Jessel and Sonny Monosson, a Boston-based consultant and DEC specialist. "The PDP-11 is probably the most successful minicomputer of all. It is still an entity in itself and still growing. The PDP-11 and the [DEC supermini] VAX evolved separately and are different machines serving different markets," Monosson noted.

Jessel said of the 16-bit market, "It's still a solid, though not exciting, business that is going to go into more new markets as the prices go down. For a lot of people 16 bits is more than enough. I think the 16-bit computer will just ride the technology and just get cheaper and cheaper and smaller and smaller." Jessel compared the 16-bit machine to the transistor, a technology that has been in place for several decades but has been repackaged into increasingly smaller, more portable and less expensive radios.

Looking at the architecture of superminis, Jessel said that the machines are likely to stay at the 32-bit level through the end of this decade. "Thirty-two bits is a lot to deal with. It's a thousand, thousand, thousand pieces of data, a gigabit of information. So, it's going to be a while before we run out of that capability.

"The changes that are occurring are more outside the CPU world, with terminals and communications. You have to remember that we never hooked up computers to each other five years ago. What we want to be able to do is to be like the phone system. We want people to be able to use a lot of computers at the same time without ever knowing that they are doing it," he commented.

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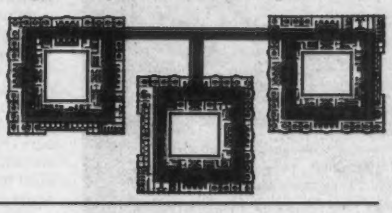

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Special Report

# Supermicros sail into small-scale systems market

## Pricing, software seen as advantageous

By James Connolly

Pricing and software availability are key advantages that supermicrocomputers — small, 16- and 32-bit multiuser systems — enjoy as they make inroads into the minicomputer market.

Those advantages are helping to squeeze the minicomputer from the low end, with superminicomputers applying pressure from the top. But while supermicro vendors steadily gain market share, even traditional minicomputer manufacturers have introduced their own supermicros, low-end minicomputers are still in use and still selling.

"Many applications are going to supermicros and machines like the [IBM Personal Computer AT] that used to go to the [Digital Equipment Corp.] PDP-11 type of machines. But, DEC still sells some PDP-11s," noted David Wilson, manager of the product research division for Future Computing, Inc., a Richardson, Texas, market research firm.

Another market research firm, International Data Corp. (IDC) of Framingham, Mass., estimated that the minicomputer and the supermicro will split the small-scale computer market for 1985, with the balance steadily shifting from traditional minis to supermicros until supermicros own 79.6% of the market in 1990.

IDC said the pricing battle in the early supermicro market appears over. "In the future, supermicros will move up dramatically in capability. The capability of future microprocessors will let systems support up to 16 users in a truly interactive environment," said the company in a recent report titled, "Supermicrocomputer Market."

Future Computing identified 109 supermicros in a recent study and defined them as having prices higher than $15,000 with hard-disk capacities ranging to 2M bytes and supporting up to 32 users.

Wilson said that a company looking for a new system to support eight to 16 users would find comparable performances between minicomputers and supermicros but that the cost advantages in supermicros do not always justify junking an existing minicomputer. That decision will depend on the individual company's situation, he said.

According to Wilson, the second major reason for the projected growth of supermicros is "software availability — there is a miniscule amount of software for minis because the manufacturers, for whatever reason, never adopted the types of standards that have been adopted in the micro world. The minicomputer vendors kept their proprietary operating systems and software." He noted that AT&T Unix is one of the few standards in the minicomputer market, and even that can be ported to supermicros.

### Microprocessors aid market share

Wilson and the IDC report concurred that the development of new microprocessors will boost the supermicro market share by increasing the number of users that the supermicros can support.

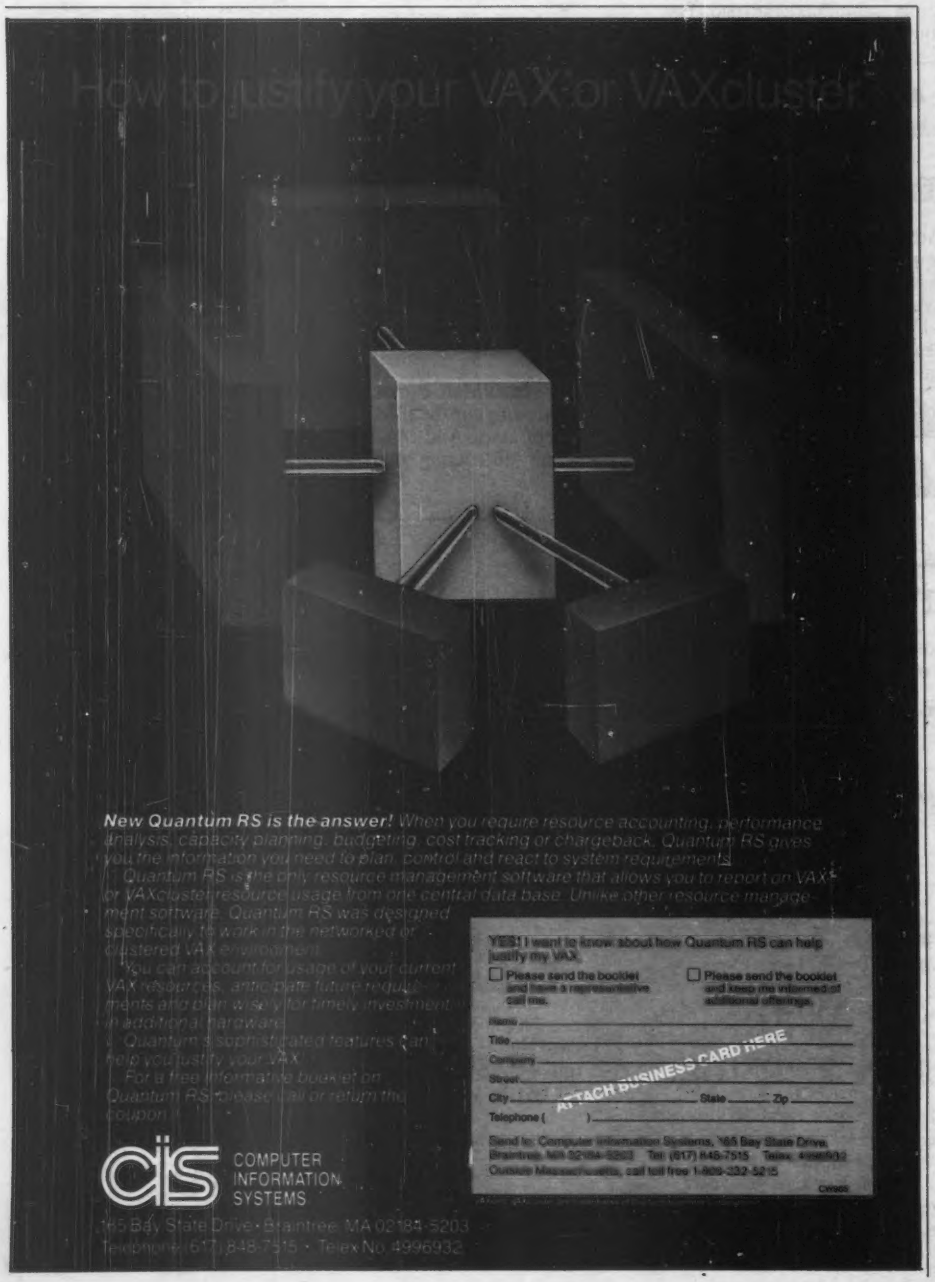
"If you are talking about four or eight or 12 users, most of those 109 products out there are fairly potent systems and can handle that many users, though perhaps not 32 users. Keep in mind that this is the $15,000-and-up category. Even one step below, at the $10,000 level, the systems might handle 16, though not 25 users," he added.

The introduction of the Motorola, Inc. 68020 microprocessor, with its 32-bit input and 32-bit processing power, allows the supermicrocomputer to get closer to full 32-user support, Wilson noted.

He said another trend to watch for is a move toward networking intelligent workstations such as personal computers around "some kind of file server based on a supermicro architecture," and away from systems where a supermicro serves a handful of dumb terminals. He recommended that a minicomputer user now planning a local-area network should ensure that the network architecture will allow them to swap hosts if they shift to a supermicro in the next few years.

The IDC report observed that traditional minicomputer vendors such as DEC, Data General Corp. and Hewlett-Packard Co. are implementing their larger system processor technology in chip-level form to push into the supermicro market.

The report said, "At present, the newer supermicro vendors' [Altos Computer Systems, Inc. and Fortune Systems Corp.] offerings are more cost effective in less than four-user configurations. Yet, the upgrade path is limited. For the customer that chooses the established mini vendors' offerings, the initial small configuration cost is higher, but the migration path is available. Unix is supposed to eliminate this problem for the user, but that is still a fairy tale."

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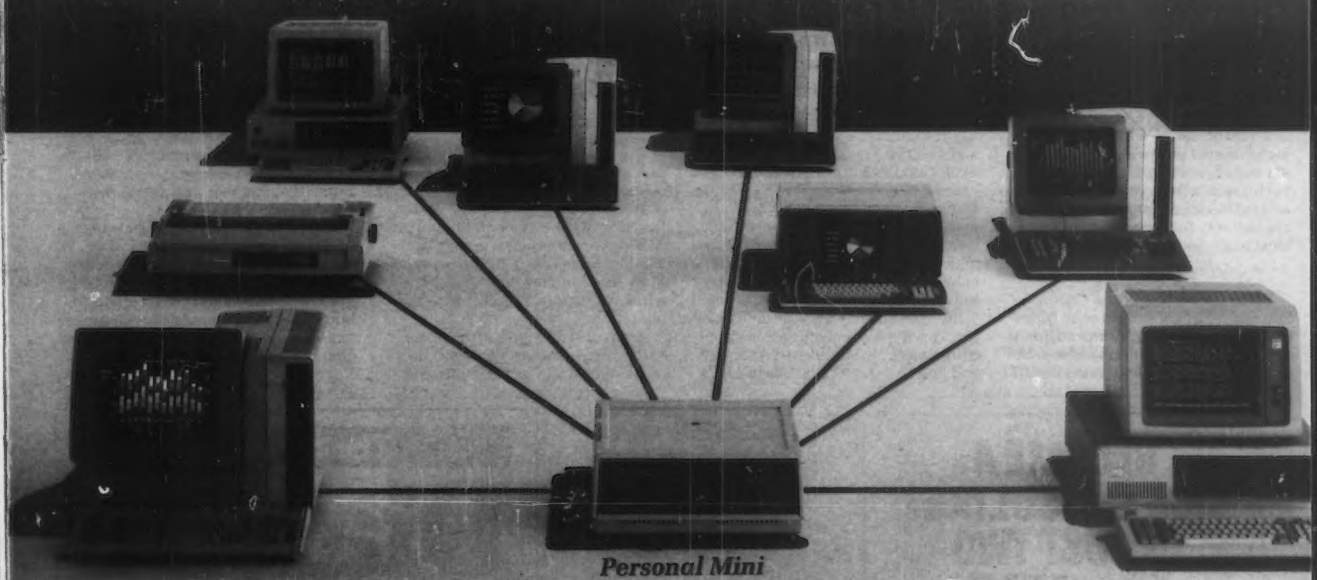

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Special Report

# Distinction exists between parallel, multiprocessing

## But both serve as stages in evolution

By George Weiss
Special to CW‡

Multiprocessing and parallel processing are often spoken of in the same breath, with little or no distinction made between them. This state of affairs has led to confusion, and the record needs to be set straight.

Multiprocessing is, in the most general sense, a division of labor: a way of partitioning user and system tasks among multiple processing elements. Within such an architecture, several jobs can run at the same time — each on a separate processor.

Parallel processing specifically addresses one feature of multiprocessing that reduces instruction execution time by allocating different portions of a single program to various processors. When programs run concurrently, portions of different programs share the same processor.

Both multiple and parallel processing are emerging as mechanisms for achieving substantial performance improvements over traditional uniprocessing, and they can be best understood as stages in an evolution toward that end.

Uniprocessors, which put the major burden of performance on a single engine, are rapidly approaching performance limitations imposed by an architecture that has not changed appreciably for the past 20 years. Most of the performance increases in the past five years have come from fine-tuning existing machinery rather than from making major changes to it.

To counter the architectural constraint, traditional minicomputer vendors have selected from a variety of performance acceleration options — pipelined instruction execution, cache memory and the like — that have gradually pushed performance ratings into the range of 5 million to 7 million instructions per second (Mips).

One reason for the gradual approach is to protect users' software investments. But the performance enhancement techniques are mainly defensive strategies. They allow entrenched vendors to buy time and maintain user loyalty until developers work out designs and prototypes for a new generation of machines that will not debut for another five years.

Meanwhile, multiprocessing designs — the first solid step in an evolution toward significant increases in processing power — have begun to appear in the commercial market. The primary thrust behind them has come mainly from start-up ventures, young firms that are not bound by the constraints of an existing family of products.

By 1990, nearly all superminicomputers will have multiprocessing architectures. By binding together several and possibly thousands of CPUs in a cooperative system, mini vendors will offer performance that approaches the power of today's mainframes without imposing the environmental, physical and power constraints of the large machines.

There are limits, however, to the performance increases simple multiprocessing can bring. Processing power does increase linearly as a function of the number of linked processing elements; despite the claims vendors seem to be making, an eight-processor complex of 4-Mips CPUs will not multiply into a 32-Mips system.

This constraint will affect future advances in processing power. Because complexity tends to be compounded as more and more processing elements are added, the most likely scenario for the next decade will be an evolution in stages of multiprocessor design.

The first stage of the evolution will feature small processor complexes. These complexes will manage work loads that are independently allocated among multiple CPUs.

The next stage will involve breaking existing applications programs into parallel portions that can run concurrently. This will be done using compiler optimization, precompilers and hardware configurations and will most likely take place initially in the fields of scientific computation, numerical analysis and signal processing.

Later, at the most advanced stage of development, highly innovative architectures such as data flow will emerge. These architectures will require new functional programming languages, languages that evaluate expressions rather than rely on sequential mathematical algorithms.

See EVOLVE SR/23

*Weiss is director of the Computer Systems Strategy Program at Quantum Science Corp., an international consulting and marketing research firm headquartered in New York.*

### The evolution of multiprocessing

| | Multiprocessing | Functional Parallelism | Concurrent Parallelism |
|---|---|---|---|
| Type of Processing | Multiple applications distributed to multiple processors | Dedicated processing elements for I/O, pipelining and other tasks | Single application divided among multiple processors |
| Advantage | Increased overall throughput for many jobs | Enhanced performance from logic design within a single CPU | Faster program execution |
| Disadvantage | Operating system overhead in scheduling resources | Limitation in long-term gains | Programs must be structured for parallelism |
| Examples | Digital Equipment Corp. VaxClusters; systems from Tandem Computers, Inc., Pyramid Technology Corp. and Encore Computer Corp. | All mainframes and supercomputers | Systems that use experimental architectures such as data flow, reduction and systolic arrays |

The most likely scenario for the next decade is a gradual evolution from simple multiprocessing through functional parallelism and on to full parallelism.

> *Multiple and parallel processing can be best understood as stages in an evolution toward substantial performance improvements.*


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**JESSEL** from SR/4

ments and divisions branching off to manage their own data processing rather than having a single data center serving the entire corporation with mainframes.

But Boston-based consultant and DEC specialist Sonny Monosson, owner of Monosson Technology Enterprises, said the future for the supermini rests in the IBM world. Whereas Jessel conceded the large, central data base to IBM, Monosson emphasized the importance of connecting to IBM.

"I think the machines will move in the direction of the [DEC] 8600s, which you can network together," Monosson said, pointing out IBM's substantial installed base.

"So I suppose if I were DEC, I would make sure the 8600s and other systems could talk to IBM's machines. . . . There is definitely going to be a consolidation, as we are starting to see, and only the strongest are going to survive," he said.


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Special Report

# Advanced CPU architectures demand MIS foresight

The use of multiprocessor and parallel systems will place additional demands on the MIS department, which must strategically plan how to apply these architectural concepts.

Planning must take place across the board because parallelism will bring change at the individual, departmental and corporate levels.

At the individual level, parallelism and the advent of voice and video integration will enable two or more workstation users to work on separate parts of a problem. The users will then communicate audio and graphics information to synthesize a final outcome.

At the departmental level, minis will become functionally specialized to provide data base management services, transaction processors and expert system decision makers.

At the corporate level, multiprocessor mainframes will handle companywide resources such as network and terminal management schemes, knowledge bases and training services.

Because of these advances, MIS directors will be faced with a number of questions. Some of the most important follow:

- Where are the organization's major applications bottlenecks, and what is the best way to distribute resources for coverage?
- What is the trade-off in implementing highly distributed parallel resources rather than continuing with centralized management and control?
- Which applications are most amenable to conversion to parallel code, and which applications are likely to become obsolete?
- Will the organization require a new operating system? If so, who will provide support for it? Will the organization have to hire new staff members?
- Will standards emerge to protect the organization's investments?
- What strategies is the organization's current vendor planning for the near future? Will the vendor take the organization's needs into account and help the organization work toward its goals?
- What problems have other organizations encountered in their experiences with multiprocessing?

The risk inherent in innovative new technologies is that if too much complexity is attempted at once, users may never get out of the technology wave and into the applications phase. Organizations should be prepared to wait through a reassuring period of evolution before they take the bold steps that the future will require.

— George Weiss

## Forces propel trend toward new systems

A number of driving forces inside and outside the minicomputer market will propel the trend toward multiprocessing and parallel processing:

- Traditional suppliers, such as Digital Equipment Corp., have to protect their currently installed bases from encroachment by both start-up ventures and established mainframe vendors.
- The scientific community — a large customer for mini vendors — relies heavily on competitive benchmarks, and multiprocessors tend to outperform uniprocessors, giving multiprocessor vendors a tactical marketing advantage.
- Tandem Computers, Inc.'s proven record of user acceptance for the concept of multiprocessing will give strength to the trend of distributing transaction work loads.
- Very large-scale integration microprocessor building blocks from Motorola, Inc.; National Semiconductor Corp. and Intel Corp. — coupled with speedy design-to-fabrication turnaround — cut the expense and add to the convenience of designing multiprocessor-based systems with high-speed, standard bus interfaces.
- Academic research is making progress toward functional programming languages that are suitable for parallel architectures. The defense establishment is setting milestones to achieve in advanced systems development. And commercial suppliers are pooling their talent to study parallelism as a major objective for next-generation systems. They are doing so through the Microelectronics & Computer Technology Corp., commonly known as the MCC consortium.
- The American computer industry sees the Japanese fifth-generation and supercomputer projects as a threat to its dominance. This perception has given a sense of urgency to the develop-

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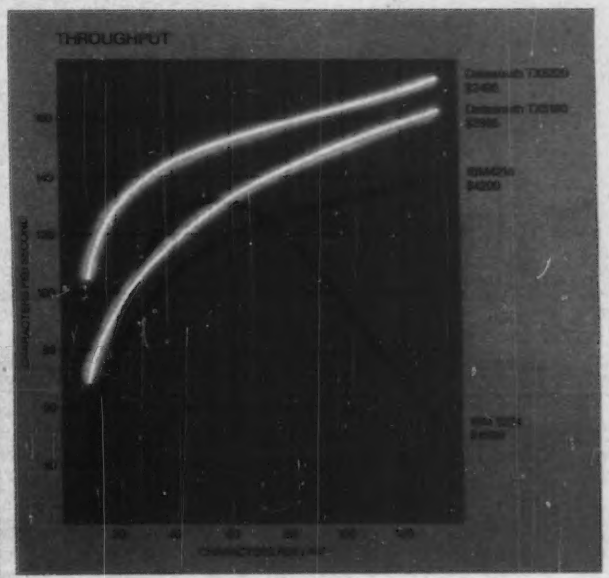


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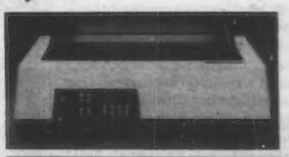

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Special Report

# Nasa contractor develops mainframe programs on mini

HUNTSVILLE, Ala. — Programmers who work for a National Aeronautics and Space Administration contractor are using a minicomputer to develop CICS applications for IBM mainframes.

The development environment at McDonnell Douglas Technical Services Co. was born of necessity rather than choice, according to systems analyst James Tate, and it has some drawbacks. But programs written on the minicomputer for the mainframe have proven themselves easier to develop and more efficient to use than those written on the mainframe itself.

McDonnell Douglas integrates various vendors' hardware and software and tests the resultant systems to see that they will work aboard Nasa's Spacelab, a laboratory that travels in the cargo bay during some space shuttle missions. McDonnell Douglas farms out all software development for the Nasa project to subcontractors but maintains a small programming staff to support its business operations.

This spring the firm began developing those applications with Netron, Inc.'s Computer Automated Programming (CAP) code generator on a 4M-byte Wang Laboratories, Inc. VS 100, after more traditionally developed programs brought on severe response time problems.

> ***Development time for both of the completed applications was a fraction of what it would have been under SQL.***

McDonnell Douglas' programmers had developed and run the applications with SQL on a 4M-byte IBM 4331. Because of the 4331's limited resources and SQL's high overhead, users had to wait as long as 10 minutes for the results of certain calls to the data base.

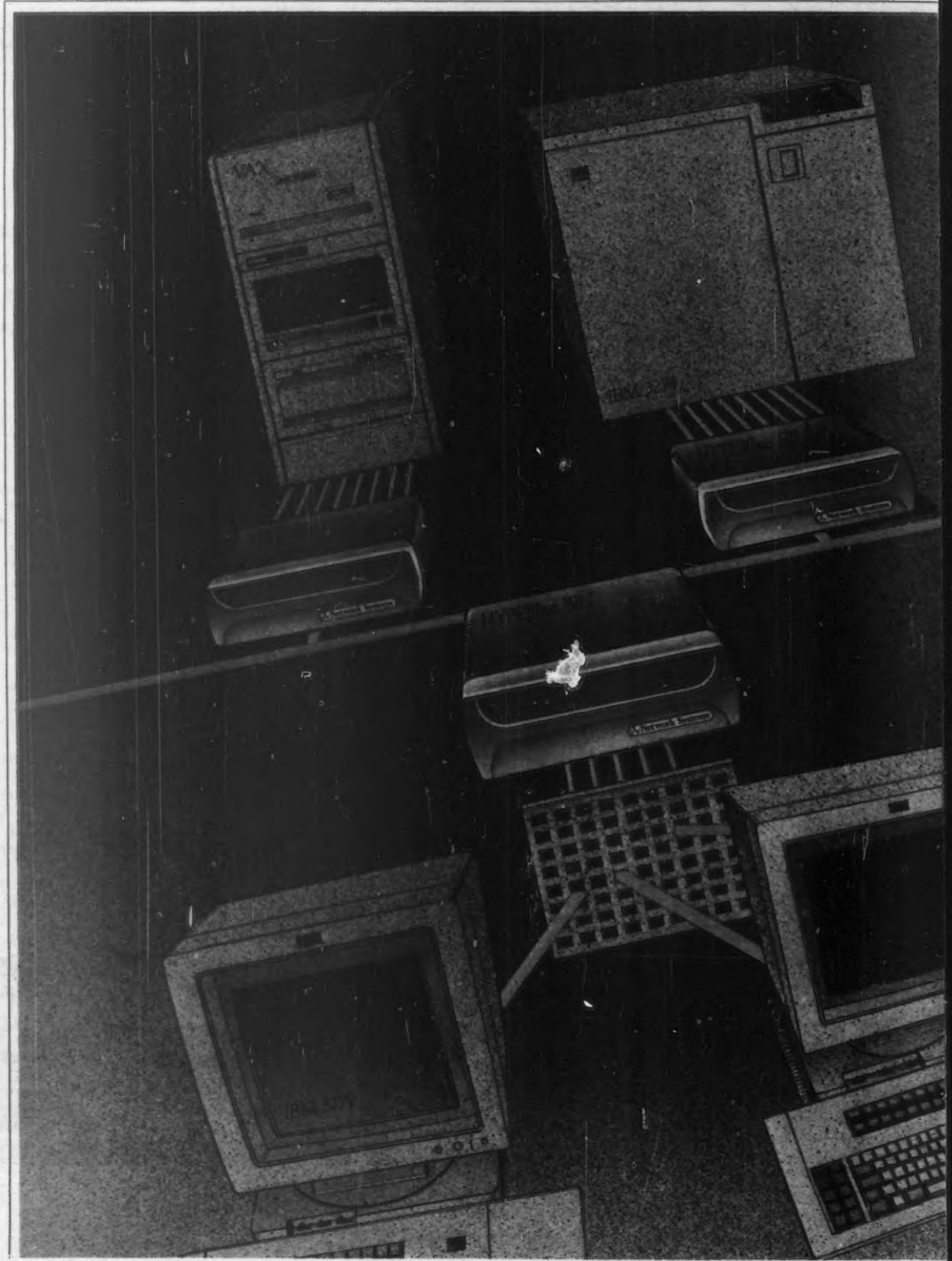
"We were kind of lucky about it, because most of the users who had response times like that didn't know that you were supposed to have [them] any faster," Tate said. But the lags affected development as well, and as soon as the programmers came across a better approach, they tried it.

One programmer in McDonnell Douglas' shop used CAP on the VS 100 to develop Cobol programs for that machine. Because that programmer got amazing results, Tate said, when Netron offered a mainframe programming product, the firm decided to buy it.

The ability to program on the mini for the mainframe depends on CAP's processor, software that pulls together frames of source code, generates code to fill them, surrounds the source with JCL and sends the code via RJE lines to a mainframe compiler. McDonnell Douglas compiles programs written with CAP on a 16M-byte IBM 4341 and tests them on that machine. Once the applications are completed, they can run them on the 4331 or the 4341.

In conjunction with the implementation of CAP on the Wang mini and the use of the 4341 along with the 4331, McDonnell Douglas began using Vsam rather than SQL as the data base environment for all new applications on the two IBM machines. The combined efficiencies of the faster mainframe, the new data base environment and the generated code have brought users' response times into a more desirable range.

Tate said he could not calculate the exact benefits of the moves because every application has changed somewhat with the switch in environments. He said, however, that users were



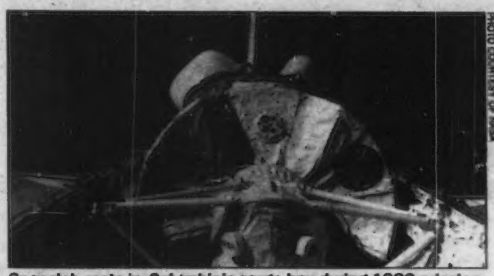


PHOTO COURTESY OF NASA

Spacelab rests in *Columbia's* cargo bay during 1983 mission.

satisfied with the speedier response times. "User relationships are much better than they were," he added.

Since the firm began using the generator, programmers have used it to develop two applications — an inventory management system and a spreadsheet program. A third application is under way.

Development time for both of the completed applications was a fraction of what it would have been under SQL. The programmer for the inventory system, who has since left the firm, said she accomplished in four weeks more than she could have in six months with SQL. Tate, who developed the spreadsheet, claimed similar results.

The generator was not much faster than SQL would have been for initial development, he said. He had to design most of the frames for the application, and the job took him three weeks, about the same amount of time an SQL application would require.

But for postdevelopment changes brought on by users' initial oversights, the code generator paid off handsomely. Users had requested the application in haste, Tate said, "and they really didn't have any idea what they wanted, which is typical." In turn, they requested about five changes after the spreadsheet had been designed and tested.

Tate said he would have needed about two days to hand code each change and apply it to each affected program. But with the code generator, each change took only a few hours.

He explained that to make a change, he simply altered parameters within the appropriate frame and recompiled the application; a change to a given frame altered code in every relevant program.

Although development with the code generator on the mini has helped McDonnell Douglas' programmers, Tate said he would prefer a development environment that did not depend on linkage between the Wang and IBM machines.

"I would be much more thrilled with CAP if it [ran] on an IBM system," he said, "because most of the problems that we have had with the system have been with the Wang-IBM interface."

> *Tate said he would have needed two days to hand code each change. But with the code generator, each change took a few hours.*

Specifically, he said, McDonnell Douglas has had trouble keeping its RJE lines up. Netron has indicated it may make a CAP version available for use on IBM mainframes sometime next year, Tate said, and McDonnell Douglas has offered to serve as a beta test site if the vendor releases such a product.

Until then, the firm has little interest in seeking out a different code generator that already works with IBM machines. "There [are] not that many code generators around," Tate said, "and we kind of like the CAP processor."

Netron's president, Alex F. Kisin, said he could neither confirm nor deny the likelihood of a CAP release for IBM machines.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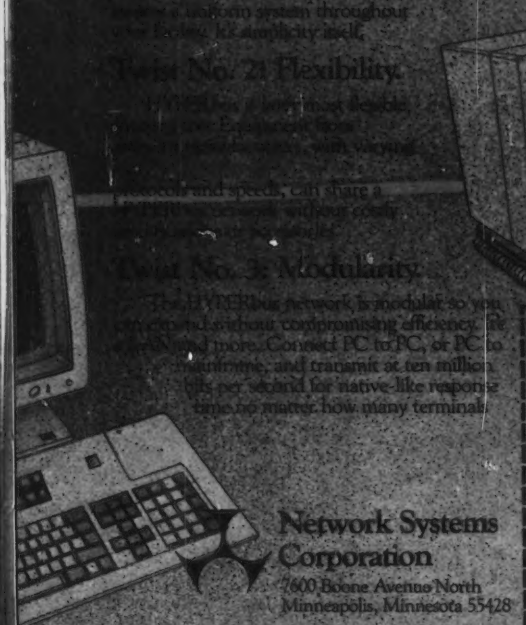

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Special Report

# One means, two ends: Net setup satisfies needs of two users

USER REPORT

**HENNEPIN COUNTY BUREAU OF PUBLIC SERVICE**

**Problem:**
Sharing CPU with other users groups limits developers' resources.

**Solution:**
Network of 32-bit processors.

**Benefits:**
Lower processing costs, guaranteed access to processing power.

**HOPKINS, Minn. — Over the past nine years, software developers at a county agency have moved their departmental computing across three system environments. They started with a traditional minicomputer, switched to an IBM mainframe and finally went with a local-area network of 32-bit processors.**

Programmers at the Hennepin County Bureau of Public Service relied on each system to support development of a software package called Ultimap, an interactive mapping and civil engineering graphics system.

Ultimap development began in 1976 on a Digital Equipment Corp. PDP-11/70. Developers switched to an IBM 3033 in 1979 and upgraded to a 3081 in 1982. In February 1984, the team acquired a network of Apollo Computer, Inc. 32-bit workstations and associated software.

According to Ted Lachinski, technical supervisor for the bureau's systems division, the setup based on the 32-bit processors has been the best. System features such as a distributed data base, a series of graphics routines and on-line debugging capabilities "just make the development effort much easier to do," Lachinski said.

Hennepin County brought in the microprocessor network in response to limitations of the IBM configuration. Developers had been designing Ultimap to run under IBM's IMS on the 3081, a 32M-byte machine that served as the county's central CPU. They worked with vector-refresh graphics terminals attached to the host. Both the terminals and the host limited the development group's efforts.

Lachinski said the terminals, which had been state of the art when the county purchased them in 1980, could not match the capabilities of newer raster-refresh models and fell short of the Ultimap developers' desires.

The Ultimap team wanted to give end users the capabilities to display at least 3,000 graphics entities in one map and to make changes to these entities without enduring lengthy response times. The terminals, however, could only handle about 500 entities. Under this limitation, end users could not access and update mapping data for an entire city but would have to proceed area by area.

The mainframe environment limited them further. Lachinski said the Ultimap developers faced problems concerning data base capabilities, system resources and processing costs.

**Data base capabilities.** Programmers working on Ultimap wanted to develop a system that nontechnical users could understand, according to Lachinski. The development team was also concerned that end users would not be able to create their own data bases and generate their own reports with IMS. "We decided we wanted a more flexible data base management system to run Ultimap," he said.

IMS also fell short as a development environment, especially in its inability to support on-line debugging. Because program updates ran one at a time in batch mode, productivity was limited. Lachinski said different developers could submit updates simultaneously, but each had to wait for his job's turn to run.

**System resources.** Because Ultimap developers shared the county's host with other users groups, the developers had to vie for resources and work under some processing restrictions. They were limited, for example, to using 4M bytes of virtual memory.

In addition, the team had suffered from response time problems before the upgrade from the 3033, and Lachinski said he worried that the situation would reoccur as the 3081 took on increased processing loads.

**Processing cost.** Although Hennepin County did not impose chargeback on its user departments, it did monitor users groups' processing costs. Lachinski said the Ultimap team, because of its computer-intensive work, incurred high costs that were difficult to justify in relation to more pressing jobs that required fewer resources.

Since the county installed the microprocessor network, the Ultimap team has begun to overcome the limitations.

■ Each of the 17 workstations on the network — 12 in the county's offices, five in the city of Minneapolis' offices — uses raster-refresh technology. In benchmarks with Ultimap running on these workstations, programmers have been able to display maps with 35 times more graphics entities than possible with vector-refresh terminals and IBM host. Lachinski said the Ultimap team hopes to increase the display capabilities even more by the time the system goes into pro-

See HENNEPIN SR/34

USER REPORT

**LAMBTON COLLEGE OF ALLIED ARTS AND TECHNOLOGY**

**Problem:**
Computing environment falls behind the times.

**Solution:**
Network of 32-bit processors.

**Benefits:**
Student access to Unix, increased processing power at low cost.

**SARNIA, Ontario — When the fall term started early this month, a small college threw two state-of-the-art Ethernet networks of 32-bit workstations and traditional minis to the lions.**

The networks, installed over a year's time and tested under controlled conditions this summer, seemed to have met Lambton College of Allied Arts and Technology's goals of interconnecting dissimilar machines and transferring files among them. During the summer tests, the networks performed as planned, and the college expects them to do the same now that they are in full use.

But according to Art Boyd, director of computer services, "That's all theory so far." He said only time will tell whether or not the equipment will hold up in the quirky environment for which it was intended — that of student computing.

Lambton College brought up its network as part of an ongoing effort to pull itself out of computing's dark ages and into the present, Boyd said. The effort began less than two years ago, when Lambton's only CPU was an 8M-byte Digital Equipment Corp. VAX-11/780 that supported 96 terminals.

Today, with the network installation completed, Lambton has 16 CPUs: the original mini, a 6M-byte DEC VAX-11/750 and 14 Cadmus Computer Systems, Inc. 9000 32-bit workstations, each with 1.5M bytes of memory. Together, the CPUs support 185 CRTs, eight full-color computer-aided design workstations, 27 printers and one plotter.

The machines are connected by two Ethernet networks, running in underground cable. One network, based on the TCP/IP protocol, supports the two VAX machines and six of the Cadmus 9000s. The other, based on Cadmus' Unison, supports nine of the Cadmus processors. Two of the Cadmus 9000s are on both nets; these machines provide gateways for file transfer between one network and the other.

"For a college of 1,500 students," Boyd said, "we're closer to the state of the art than anyone." The up-to-date network evolved from the three following goals the school set at the beginning of the modernization:

■ To bring in as much processing power as budgets would allow.

■ To introduce students to the AT&T Unix operating system.

■ To stay flexible and keep the school from being tied to any one vendor.

According to Boyd, the current configuration has gone much of the way toward meeting each goal.

**Processing power.** Boyd said Lambton College sorely needed additional power when the project began. He asked DEC to determine how many of its machines the school would need to support about 100 additional terminals. The vendor, which had not yet introduced its 8600, recommended the addition of four VAX-11/750s.

The combined cost of the single 11/750 and the 14 Cadmus machines that Lambton bought instead was lower than that of the recommended four VAX processors, according to Boyd. Together, the 11/750 and the Cadmus machines support about 140 terminals.

The Cadmus machines are not true 32-bit processors; they have a 32-bit internal capacity and 16-bit data transfer. But, Boyd said, they meet the school's needs well.

**Unix availability.** With Unix gaining importance in the business world, Boyd said, Lambton College wanted to introduce its computer science students to it. He wanted to keep the DEC VMS operating system, however, because the school had invested in a software base for the VMS environment and because Unix software offerings are not yet extensive.

The new network supports both the VMS-based DEC machines and the Unix-based Cadmus 9000s, he said, so students will have the opportunity to learn both operating systems.

**Flexibility.** Boyd said he did not want to tie the school to any one vendor's technology, lest Lambton get locked out of future technical advances. Support for two vendors' processors has worked well, he said, and the network should allow the school to add other manufacturers' equipment if needed.

The fulfillment of the three goals did not come without its problems. Before Boyd saw the network in place, he had to wait out a deep freeze, which prevented workers from laying the underground cable for the network, and a faculty strike, which further delayed the project.

More pressing, though, was a traffic problem that surfaced during initial testing last winter. Boyd had hoped to use one Ethernet network rather than two, and his staff had been testing the single-net configuration.

See LAMBTON SR/34

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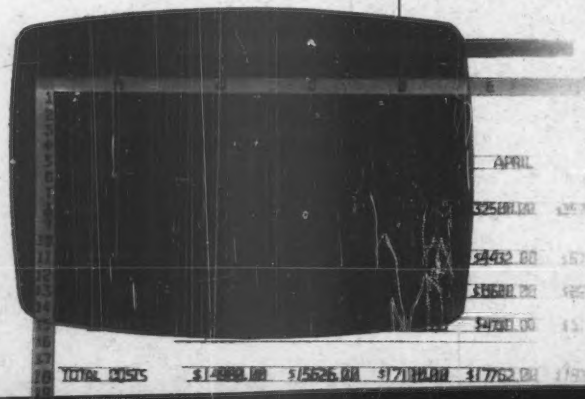

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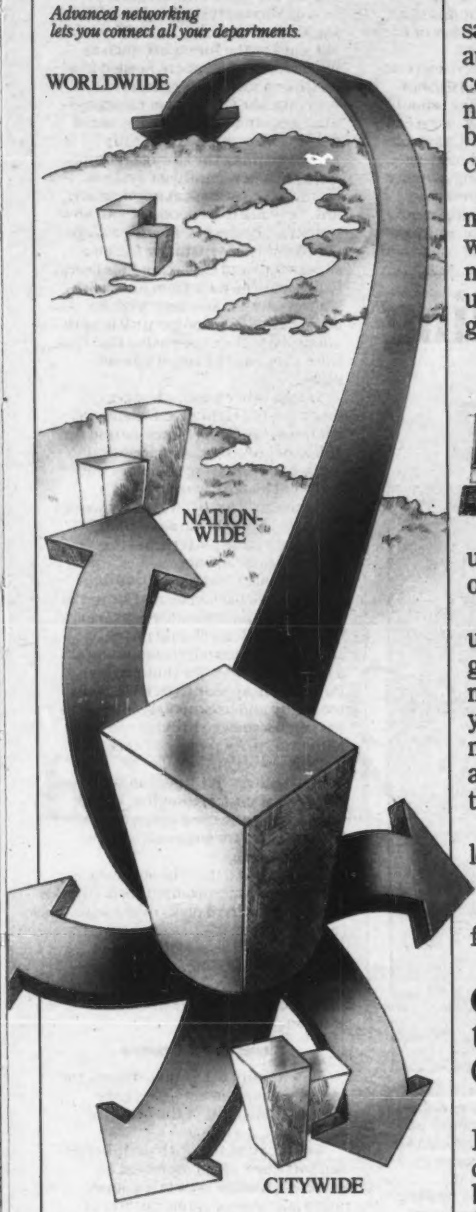


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# Honeywell

Special Report

# Strengths of supermicros, minis vary with application

## Systems must satisfy user and storage needs

By Constance A. Knapp
Special to CW‡

Small business or departmental system users who are in the market for a new multiuser system should carefully weigh the qualities of both supermicrocomputers and traditional minicomputers. Although supermicros and minis are both multiuser machines, the systems have markedly different strengths depending on the application.

As in choosing any system, the user needs to know what business needs the system must satisfy. In choosing between a supermicro and a mini, the two following areas need to be examined carefully:

- The number of users on the system at any one time.
- The storage requirements, including access and transaction activity.

When determining how many users will be on the system at one time, it is also important to consider what their usage patterns will be. Will four users be on at four different times of the day, performing four different functions, or will four users be on at the same time, performing two different functions? Will eight or 10 people need access to information at peak periods, and if so, is response time important? Answers to these kinds of questions will help determine whether or not a minicomputer is required.

Generally, a supermicro can comfortably handle eight to 10 users, although specific machines should be examined very carefully; some can handle more, some less. A minicomputer can support many more devices, with some handling as many as 100 terminals and printers.

The operating systems of most minicomputers are truly multiuser-oriented and can control usage and access by more than one terminal. At this point in the development of supermicros, some of the multiuser operating software is merely an extension of Microsoft Corp.'s MS-DOS or Digital Research, Inc.'s CP/M, without some of the functions, such as update control, that are needed in a multiple access environment.

Again, the specific operating system or equipment being considered needs to be examined carefully.

Determining the storage requirements of a new multiuser system requires a close look at applications, how they are to be accessed and how sensitive the data is. Placing a large (10,000-record) customer file on a supermicro and expecting four users to retrieve the data from four workstations at the same time with no degradation in response time is unrealistic. So is the expectation that this file can be easily backed up each night.

On the other hand, a budget system allowing eight departments to enter weekly budget information for 100 expense codes, with a central department creating summary budgets, will usually work well on a supermicro. The difference between these examples is the amount of data, the access pattern and the backup requirements.

As a general rule, sensitive data that must be backed up and stored to satisfy regulatory requirements or company policies should not be stored on a supermicrocomputer (or a microcomputer, for that matter). Data can disappear from hard disks too easily and backup procedures are too cumbersome to provide the level of data security required for sensitive information.

Management information, such as budgets, or information that can be re-created if the need arises are likely candidates for supermicrocomputer storage.

Keep in mind that the storage media for supermicrocomputers is still floppy disks, hard disks or cassette cartridges.

While each has its advantages, none allows the simple and speedy backup and recovery that a disk pack and/or tape drive provides a minicomputer.

### A question of finances

As with any other investment, the cost of the equipment needs to be considered in light of the benefits expected.

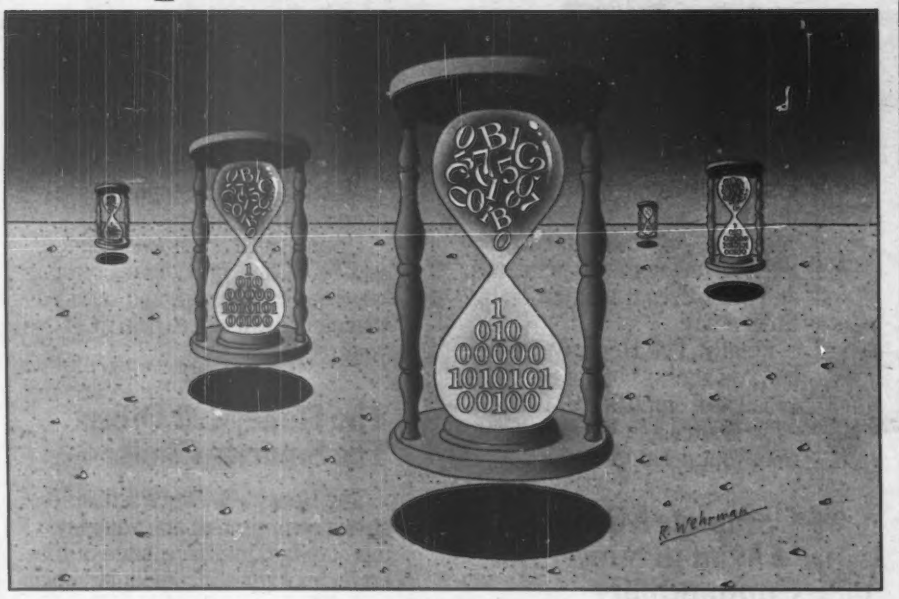
A minicomputer, with peripherals and software, could represent an $80,000 investment, while a supermicro may cost only one quarter of that amount.

However, data as a company investment must be protected. If the company's books are kept on a supermicro that proves impractical for data security, and data is destroyed or lost, the cost of recreating the data, as well as any damages, may

See VARY SR/29

*Knapp is a New York-based computer consultant, specializing in the selection and installation of financial software. She is a member of the Independent Computer Consultants Association and a lecturer at Pace University in New York.*


# Without complete understanding of user needs, software development can take forever.



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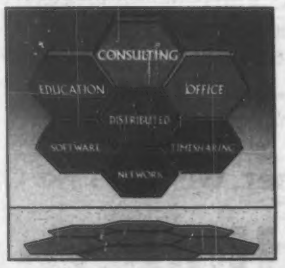


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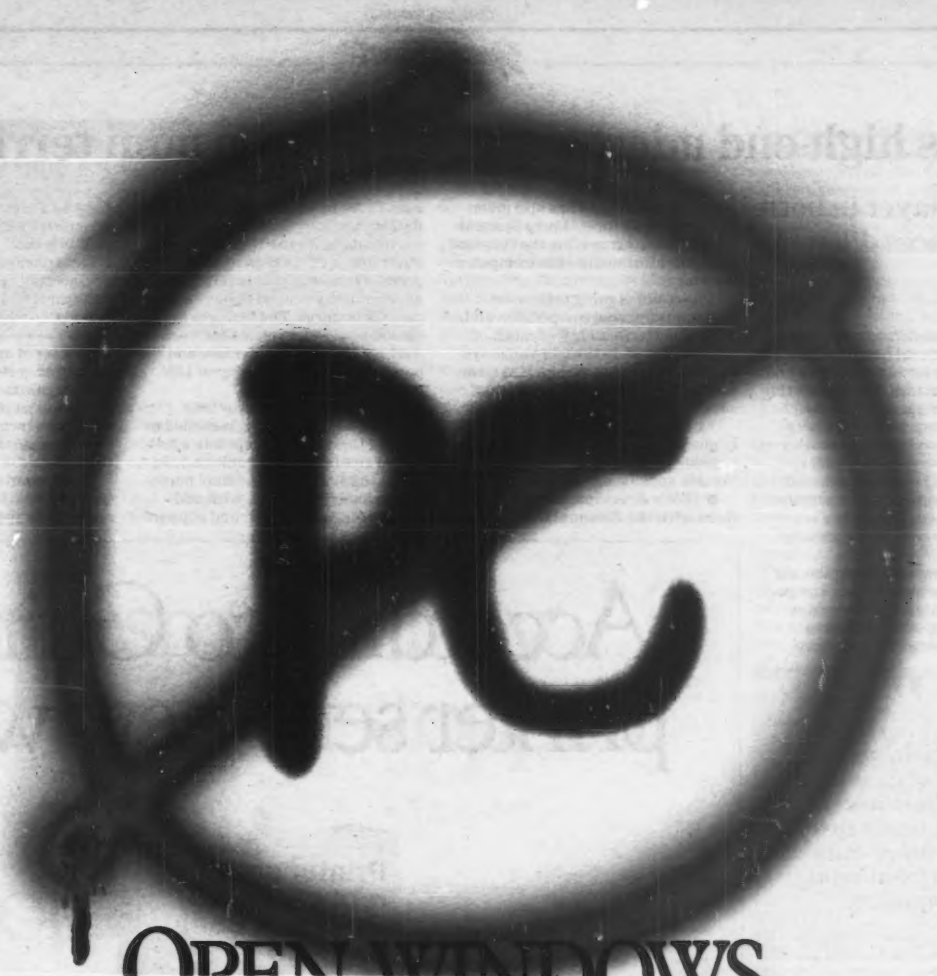


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Special Report

# IBM's high-end micros encroaching on mini territory

## Major player in both marts faces dilemma

By Brian Jeffery
Special to CW‡

Like many minicomputer vendors, IBM is facing the difficult decision of how to balance its minicomputer and microcomputer lines. The impact the microcomputer is making on the minicomputer market cannot be ignored. As microcomputers move to adopt more powerful 32-bit microprocessors, they begin to undercut conventional minicomputer architectures, offering equivalent or even superior performance for radically reduced prices.

For IBM, however, the problem is greater than for most vendor companies. It is the only major computer firm to be a large-scale player in both the minicomputer and microcomputer markets.

> ”
>
> *In the long term, IBM will shift much of its mid-range business to micro-based systems rather than conventional minicomputers.*

It has been in the minicomputer business since the early 1970s; in 1985 its various mid-range lines are likely to contribute close to $5.64 billion in revenue. Yet its microcomputer business has been even more successful.

Since entering the personal computer market in 1981, IBM's line of Intel Corp.-based micros has grown to be a $5.8 billion business in 1985. The installed base of these units will have grown to close to three million units by the end of this year, with a worldwide base of more than 12,000 applications software products and 4,500 dealers and distributors.

IBM has already moved from the Intel 8088-based CPU to the more powerful 80286-based CPU used in IBM's Personal Computer AT. The company has indicated that it is moving onto the full 32-bit 80386. Many IBM Personal Computer distributors are starting to offer the AT as a small business, multiuser system or as a scientific and engineering system.

IBM's dilemma is that if it lets the Personal Computer momentum continue and moves to more powerful CPUs, it will be undercutting its own low-end minis such as the System/36, 8100 series and Series/1 and, in the longer term, even the more powerful 4300 series and System/38.

IBM appears to have solved the problem by a classic exercise in contention management. While continuing to pursue the minicomputer business aggressively, it has also given the green light for its Entry Systems Division to start moving the Personal Computer line up into minicomputer territory.

The result is going to be some strenuous internal competition and, in the long term, a shift of much of IBM's business in the mid-range systems bracket to micro-based systems rather than to conventional minicomputers.

Although they have been generally missed by the industry, three key indicators confirm that IBM is adopting this approach:

- **IBM's developmental directions with the Personal Computer line.** In August 1984, IBM introduced its Topview multitasking operating environment for the Personal Computer line, a PC-DOS-compatible product that was poorly received but which rapidly proved to have some curious features. The features included a built-in Systems Network Architecture (SNA) interface and the potential for addressing up to 16M bytes of virtual memory.

It is now becoming clear that IBM's development has proceeded to expand this basic concept into a full-blown virtual memory multitasking operating system for the Intel microprocessor architecture, with additional processing power and support for AT&T Unix operating systems provided by 32-bit coprocessors.

While IBM's current focus for this effort appears to be scientific and engineering applications, the ultimate direction looks as if it will result in two major sets of applications.

One set of applications would be a multiuser system for departments of large organizations, with built-in SNA support providing a better fit with the overall IBM office automation scenario than products such as the System/36 currently provide.

The second set would be a multiuser system for small business and remote-site applications that would

*Jeffery is director of research for International Technology Group, Inc. of Palo Alto, Calif.*

According to Guinness, printer set a new world's

Printer sets record, makes Guinness Book

A Mannesmann Tally printer set a new world's record for computer printers in March, 1985.

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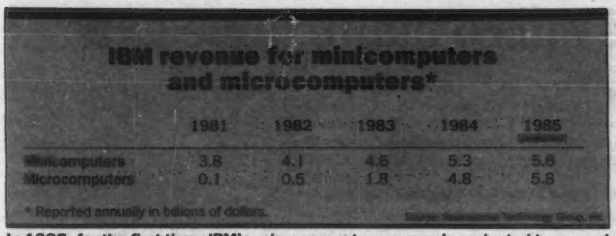
The record was established by EDP specialist Rudolf Hiener in Basel, Switzerland. According to Hiener, the goal was to beat the previous record in half the time.

When the goal was exceeded three days early by nearly 60,000,000 characters, Hiener ended the run by turning off the printer.

Three-quarters of a ton of paper was necessary to set the new world's record which was certified and will be entered into the Guinness Book of Records in autumn of this year.




**In 1985, for the first time, IBM's microcomputer revenue is projected to exceed its minicomputer revenue.**

allow the more than one million small Personal Computer users to upgrade to more powerful, compatible solutions.

■ **IBM's various minicomputer developments.** To date, IBM has introduced desktop versions of its Series/1 and System/36 minis, although these have proved to be mini-micro hybrids rather than true microcomputers.

Micro versions of the 4300 series and an in-house reduced instruction set computer mini, the 801, are on the way, although the machines seem to be targeted at specialized scientific and engineering applications rather than mainstream business use.

More interesting is that IBM implemented, then dropped, a Motorola, Inc. 68000-based version of the System/36. Apparently it was felt that such a system would seriously undercut IBM's business with its existing System/36 minis.

Overall, it is clear that IBM is not seeking to move its minis down to the micro level but rather the reverse.

In adopting this approach, IBM is dooming its minicomputers to mounting competition and ultimate replacement by upward extensions of the Personal Computer line.

■ **The 1984 ousting of the Systems Products Division from the Information Systems and Communications Group.** The little-noticed IBM reorganization in December 1984, which affected the company's Systems Products Division, is another key to deciphering IBM's strategy. The Systems Products Division is the IBM unit with responsibility for the System/36, System/38, Series/1, 8100 series and 4361 minicomputers. The division was moved from IBM's Information Systems and Communications Group and transferred to a new organization, the Information Systems and Products Group.

This move was curious because the Information Systems and Communications Group is generally regarded within IBM as the home of the company's key growth product lines.

The group's members include the Communications Products Division (SNA, communications equipment), Entry Systems Division (Personal Computers) and Office Systems (office automation software). In addition, the Computer-Aided Design and Manufacturing and Industrial Systems Divisions are placed there, and the Telecommunications Products Division (Rolm Corp., local-area networks) was added at the same time the Systems Products Division moved out.

**IBM should garner $5.64 billion from its mid-range systems in 1985.**

By contrast, the Systems Products Division's new home is shared by such illustrious IBM operations as the Boulder, Colo., and Lexington, Ky., business units. Out of these two units come 8-in. storage products, copiers, typewriters and supplies.

The move was scarcely a resounding vote of confidence, and it was notable that even the supposedly strategic System/36 was now out of the mainstream of IBM product strategy.

IBM reorganizations have always been a key indicator of company strategy. IBM does not change things that work properly. Taken with the other indicators, it is difficult to resist the conclusion that IBM approved competition between its minicomputer and microcomputer lines with an outcome that can be in little doubt.

Overall, what we seem to be dealing with is a long-term strategic shift of IBM minicomputer and microcomputer products. IBM appears to recognize that in the long term, micro-based systems will take over much of the bracket currently occupied by at least its low-end minis.

Even the System/36, a system that has proved to be the bane of its competitors, may prove to be a curtain raiser for IBM's real thrust in this market.

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Printer sets record, makes Guinness Book

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The record was established by EDP specialist Rudolf Hiener in Basel, Switzerland. According to Hiener, the goal was to beat the previous record in half the time.

When the goal was exceeded three days [illegible] nearly 60,000,000 characters, Hiener ended the run by turning off the printer.

[illegible] was necessary to set the new world's record which was certified and will be entered into the Guinness Book of Records in autumn of this year.

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*Special Report*

# Departmental minis bridge micro-mainframe gap

By Naomi Karten
Special to CW‡

The use of departmental minicomputers to help bridge the gap between micro users' needs for mainframe data and their access to that data has not picked up enough momentum to be viewed as a trend, but it is a strategy some MIS departments and information centers are beginning to assess.

The strategy makes particular sense in light of concerns about micro-mainframe links. Justifiably or not, users see the micro-mainframe connection as something that many people are talking about but few organizations are implementing on a large scale.

> *The micro-mainframe connection is something that many people are talking about but few organizations are implementing on a large scale.*

In many organizations, micros are underutilized, and users are frustrated. Both problems stem from a lack of access to data that is stashed away in mainframe data bases. Departmental minicomputers can provide the means for MIS to satisfy some groups of frustrated users, those that have a cyclical need for access to the same sets of corporate data.

The strategy for use of the minis works this way: On an agreed-upon schedule and under MIS control, mainframe data is extracted and transferred to the mini. Users can then beat the data to death using mini-based software or can download it to departmental micros for manipulation with packages like Ashton-Tate's Dbase or Lotus Development Corp.'s 1-2-3.

MIS departments can gain the following three main benefits from this approach:

- A decrease in the demands that end users' queries make on the mainframe.
- An increase in control over access to mainframe data.
- An improved ability to meet users' specific needs.

**Decreased demand on the mainframe.** This is a solution to the problem brought on by the popularity of fourth-generation languages. Many of these languages are resource intensive, a situation of concern to MIS managers who are on the line to deliver new production systems and who have little inclination to compete with users for computer power.

At its present rate of acceleration, end-user computing will dominate corporate computing within a decade. With this growing stream of users, even the most efficient user-oriented software is likely to give a finite computer resource a run for its money.

MIS executives, whose capital budgets are unlikely to reach fantastic proportions, need an alternative to forced growth in mainframe capacity. Fortunately, an extensive base of user-oriented query and analysis software — including several traditionally mainframe products — is available for minicomputers.

SAS Institute, Inc.'s SAS, for example, runs on Digital Equipment Corp., Prime Computer, Inc. and Data General Corp. equipment. Applications written with Oracle Corp.'s Oracle and Seed Software Corp.'s Seed run in a wide variety of mainframe and mini environments and on the IBM Personal Computer. Intellect, from Artificial Intelligence Corp., is being ported to the DEC VAX.

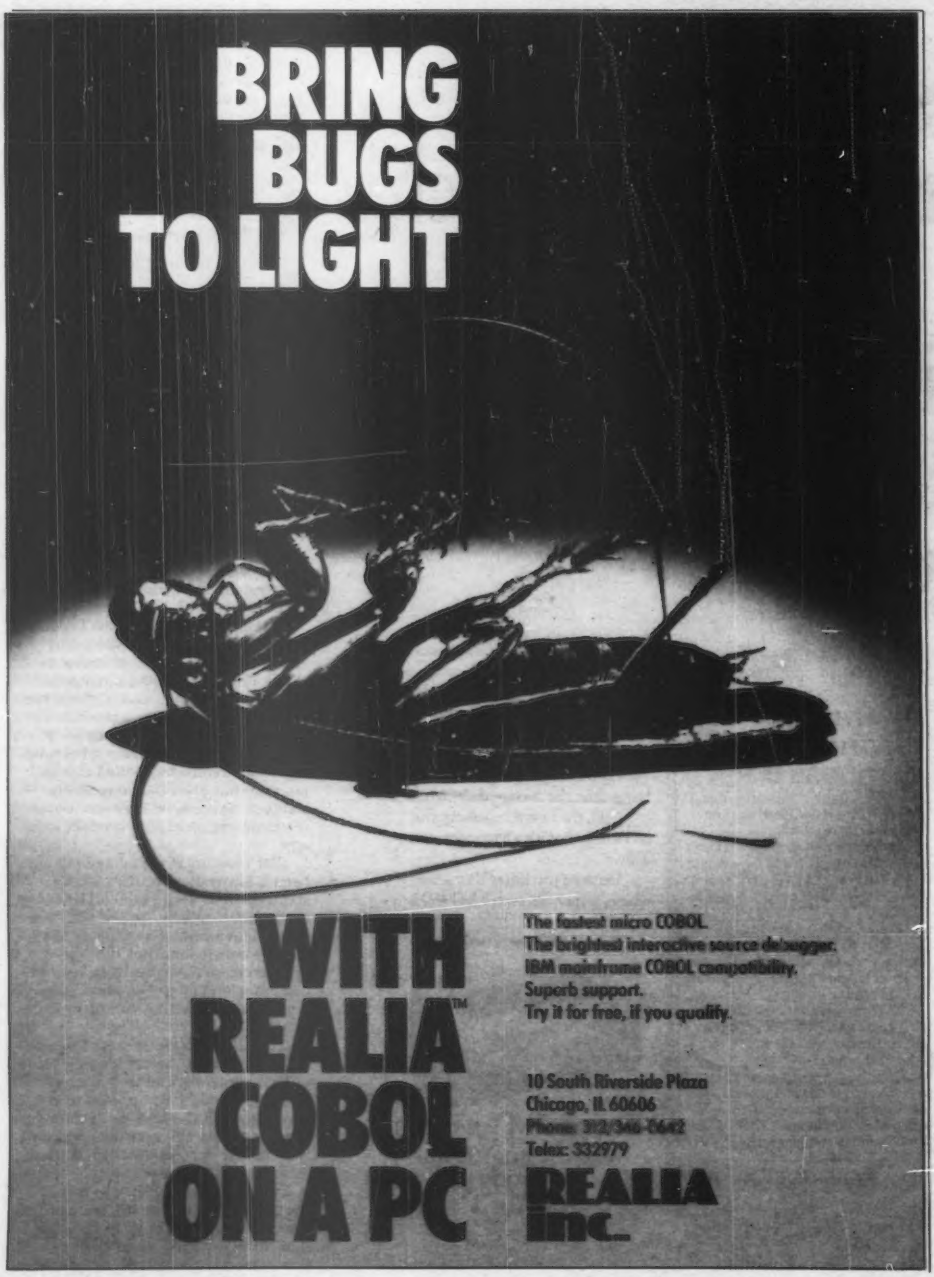
Several other vendors are beginning to view the minicomputer environment as a strategically astute base of support for information center goals. Certainly, retraining for experienced users of these vendors' products will be minimal.

**Increased control over access.** Loss of security is one of the predominant concerns associated with downloading capability and is one of the major impediments to its implementation. With a little aid from the fearmongers among us, MIS executives are lying awake at night worrying about which people are getting at what data and what they are doing with it.

The last is not an issue: An MIS manager can no more control how users juggle computer-generated data than he can control how they churn data from production reports

See **CONTROL** SR/29

*Karten, president of the consulting firm of Karten Associates in Randolph, Mass., writes and lectures on information centers and the management of corporate personal computing.*

## EVOLVE from SR/10

Moving from multiprocessing to advanced parallel processing will require a series of breakthroughs. There is a host of difficulties that must be overcome:

- Interprocessor communications, which becomes more and more complex as more and more processors are added, must be improved so that every processing element can send information to and receive information from every other element.
- Because no one architecture is optimal for every application, each of these must be weighed against each other.

Developers of computer-aided design systems, for example, must consider the advantages and disadvantages of array processing against the advantages and disadvantages of processing individual pixels.

- Because a great number of resources will be available to the user, the operating system's role will expand; the changes that will enable that expansion will be difficult to make.

Designers will have to modify the Unix kernel to handle multiple processing resources simultaneously, for example, without ruining the integrity of applications portability.

- Designers must develop a programmer's interface that is transparent with respect to the allocation of resources.

Without such an interface, programmers would have to construct parallelism manually, a process that would require several man-years of work for large programs.

- If programmer transparency is to be maintained, processor assignment and scheduling become critical system variables; idle resources can substantially degrade performance. Designers will need to synchronize the results produced by many elements and synthesize these pieces into a whole. Such synchronization and synthesis, however, is still in the sphere of academic research.
- Unless an organization's applications are written with a highly parallel structure (that is, more than 90%), its users will accrue only nominal gains in performance regardless of additional processing elements that are collected. Developers will have to implement multiple resource handling capabilities together with program concurrency that fully taxes the hardware.
- The introduction of many processing elements implies that programs can run in separate hardware partitions and in no particular sequence. In these situations, problem determination becomes highly complex; parallelism adds to the probability of inaccurate results. Developers must provide some degree of fault tolerance before users are willing to rely on a system.
- DP managers want to protect their investments in the software they have installed and the programs they have scheduled for development. They accept the need to replace hardware every five to seven years but expect their software resources to last longer. Vendors will have to address users' concerns and somehow bridge the gap between multiprocessing and parallel processing software.

## TRENDS from SR/11

ment and exploitation of new technologies and architectures.

- End users continue to demand higher performance, and they have come to expect this from vendors.
- The new applications environments that are emerging for artificial intelligence and expert systems require high performance and parallel processing as prerequisites for success.
- High-resolution, high-performance workstations need very high-performance computational and data base processors as hosts.

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Special Report

# Automation preserves life jacket maker's growth

MIAMI — Production tracking problems threatened to swamp business growth for a life jacket manufacturer until the firm installed an automated manufacturing system.

At Extrasport, Inc., four administrators relied on manual procedures to keep track of production and sales. But sales increases of between 25% and 40% annually from 1980 to 1984 began to overwhelm them.

"As you might imagine, I had to enlist grandmothers and siblings to work nights and weekends to maintain this operation," said Alex Khamamirian, Extrasport's president. "I enlisted anyone I could to help with record keeping."

Even with the extra help, Khamamirian was spending too much time keeping up with current sales to focus on his main aim: expanding his business. "We soon saw that we couldn't keep both our manual systems and our 40% yearly growth. So we decided to streamline, to automate our operations wherever feasible."

In February 1984, Extrasport purchased a Digital Equipment Corp. Decmate II with 10M bytes of disk storage and installed Exceptional Business Solutions' Manufacturing System software. Khamamirian worked nights at home setting up the system's five modules — inventory management, bills of materials, production planning, order entry/invoicing and accounts receivable — so they reflected his firm's production process.

He first defined the inventory items he wanted to track, then listed all the raw materials, interim components and production stages that went into making each item. He assigned all the stages their own inventory item numbers so the system could track them. "Since we had defined production stages as separate inventory items, the computer could plan and schedule stages as well as finished products," he said.

The system, which went live last October, takes information from customer orders and explodes it into bills of materials, cost estimates, materials allocations and production schedules. When an operator generates an order, the system updates back orders, open orders, inventory files and customers' buying history files.

Extrasport, Inc.'s president, Alex Khamamirian, keeps tight stock of the firm's life jacket inventory.

"It eliminates a lot of repetitive hand work," Khamamirian said. "When you have entered an invoice, you have updated everything you can possibly imagine." He said having the system to handle posting, updating and tracking has given him and his fellow administrators more time to run the firm.

In addition, he said, the system has alleviated some production and quality control problems special to Extrasport. Most of the firm's 750 active customers are wilderness provisioners such as L. L. Bean, Inc. and Eastern Mountain Sports, Inc. that buy erratically and in small quantities. "By the time they order, they are often low on stock," he said, "so delivery has to be fast."

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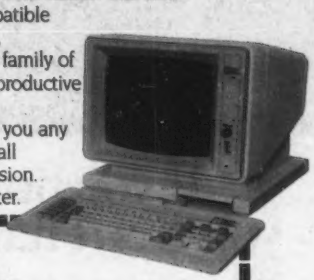

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Special Report

Before it installed the automated system, Extrasport had problems meeting such orders, Khamamirian explained. Administrators had to estimate what raw materials they had on hand, look at orders that had already been scheduled and try to fit in the extra work.

With the automated system, Extrasport can prepare in advance for seasons during which its customers typically place most of their orders. Based on information from past seasons, the system forecasts material needs, predicts required cash flow and recommends any necessary hiring, Khamamirian said.

"Also, it will look at our material suppliers' delivery times and will reorder if materials [on] hand can't meet projected usage, so we don't spend money on supplies too early, and we don't reorder too late," he said.

An indirect benefit of the system has been tighter shop-floor quality control. "This has been a real boon, because life jacket quality can't be left to chance," Khamamirian said. Quality is also one of the features that helps Extrasport sell its life jackets — specialized products that cost between $36 and $65. The firm's production workers assemble the jackets by hand; its managers and executives inspect production personally.

With the manufacturing system handling other tasks, Khamamirian and his managers have been able to spend more time inspecting jacket assembly, which has enabled them to implement new and more frequent product tests. The firm's life jackets regularly go through more than 22 quality tests.

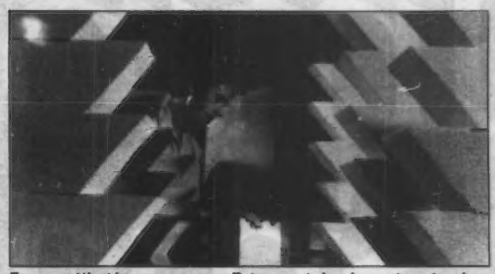
Checks cover materials and construction, stitching density, seams, buoyancy and the dimensions of foam inserts. "The computer doesn't perform these tests," Khamamirian said. "However, it has given my managers more usable time per day."

Khamamirian uses some of his time to scan the system's production reports for quality signals, which can alert him to life jackets made with too much or too little fabric or foam. When the computer generates a production order, for example, it also specifies how much fabric will be required, based on past experience.

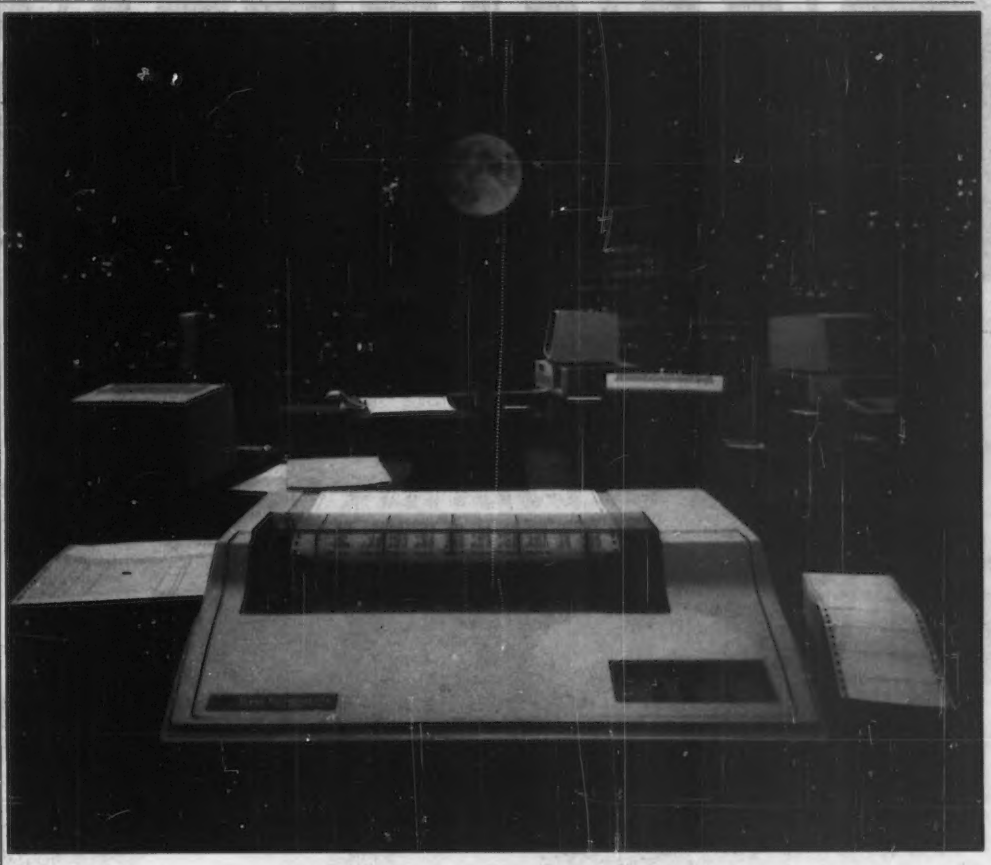
Extrasport's production workers cut material or foam for the order based on the computer's specification, Khamamirian said. "At the end of a production run, if we fall short or have too much left over, we know something's wrong."

Employees at the firm access the system through one CRT terminal. Because the software system dictates procedures, Khamamirian said, the firm's managers can delegate administrative tasks with confidence that everyone will perform them the same way.

Khamamirian said he hopes to get report formatting capabilities for the system this year. Currently, Extrasport must use formats that are written into the software and cannot choose to report by combinations of variables other than those that have been defined.



Foam cutting is one process Extrasport, Inc.'s system tracks.

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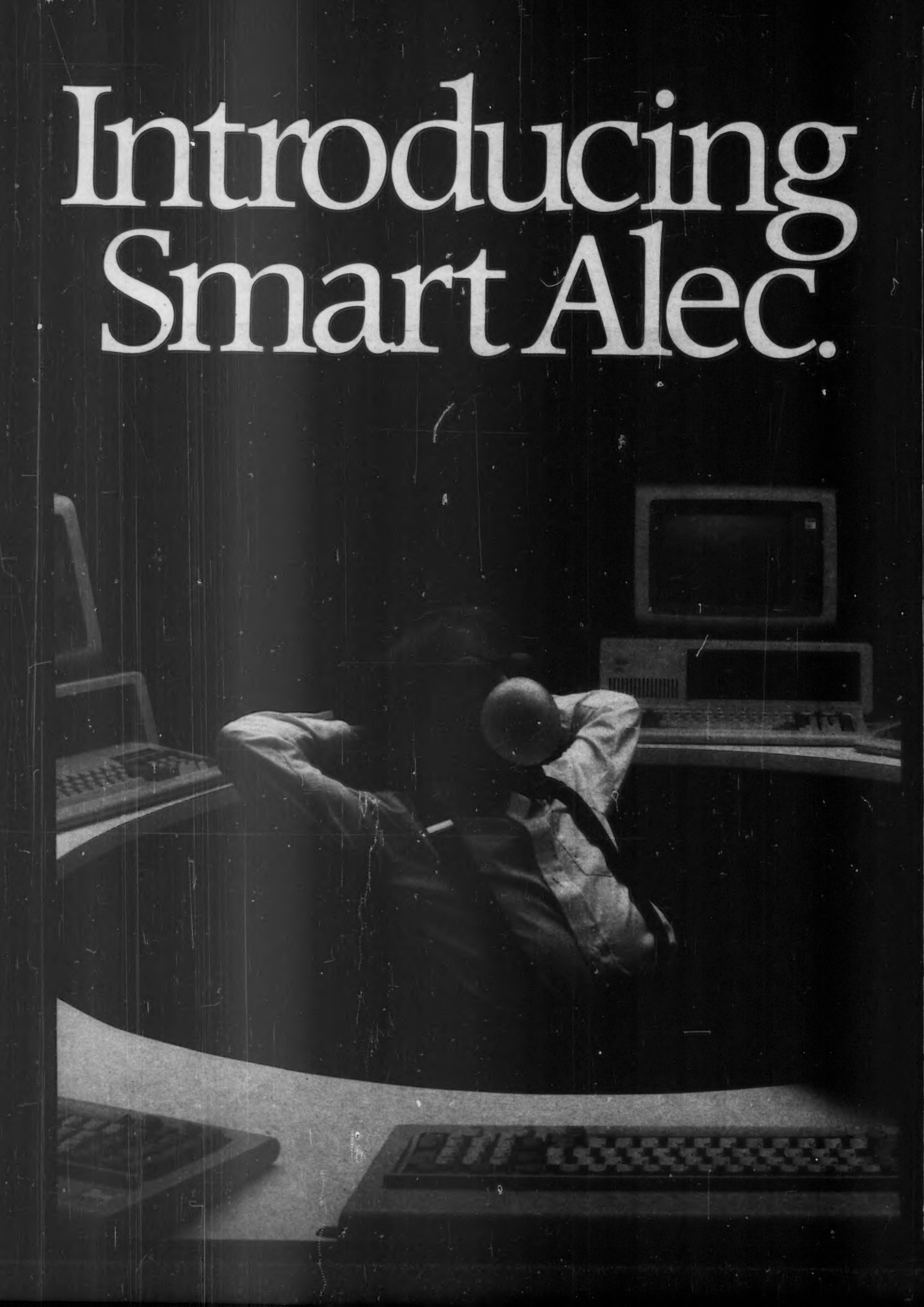

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Special Report

# Unix standardization loosening constraints in mini mart

## Emerging trends improving wares

By James E. Clark
Special to CW‡

The emergence of Unix as a standard, hardware-independent operating system carries one heavy implication for the general minicomputer market: Users will no longer be held hostage to any particular vendor's operating environment or applications software.

Less far-reaching but equally important trends are emerging within the Unix marketplace itself. Ten of these trends follow.

**1. Performance.** Many Unix system users have found that their hardware lacks the computational performance to run their applications with acceptable throughput or response time. In turn, vendors have begun to design machines that will make Unix run faster.

Vendors of scientific and engineering superminis especially will benefit from this trend because their development and marketing efforts have traditionally focused on users who need to process large volumes of data at very high speeds. Users can expect these vendors to leverage their hardware's performance and enter new markets — those outside the usual realm of real-time processing.

> ”
>
> *Minicomputer vendors will be forced to adhere to standard forms of Unix, lest they risk shooting themselves in the foot.*

**2. Operating environment.** Unix is becoming standardized. Today, only two real variants exist: AT&T's System V and the University of California at Berkeley's 4.2. Any versions that deviate from these two are quickly being brought into line. In addition, the efforts of the Institute of Electrical and Electronics Engineers, Inc. will yield a standard baseline for the future.

Vendors will be forced to adhere to standard forms of Unix, lest they risk shooting themselves in the foot. Within these standard forms, however, vendors will distinguish themselves by adding features and enhancements such as increased security measures, fault tolerance, real-time processing and multiprocessor support.

**3. Compliance with both standards.** The existence of two major Unix variants has led to the advent of multiple operating system strategies. Different vendors take slightly different technical approaches, but they all provide the same basic functionality — compatibility with both dominant Unix implementations.

Within two to three years, today's compatibility issues will be worked out. Nearly every vendor will accommodate both the Berkeley 4.2 and the AT&T System V environments by implementing some mechanism to combine the two.

**4. Convergence.** Eventually, the two Unix versions will converge into one. This will happen less because of the efforts of any one vendor than because of marketplace demand. Users will call for an implementation of Unix that has the benefits of being the standard and of offering high performance and full functionality.

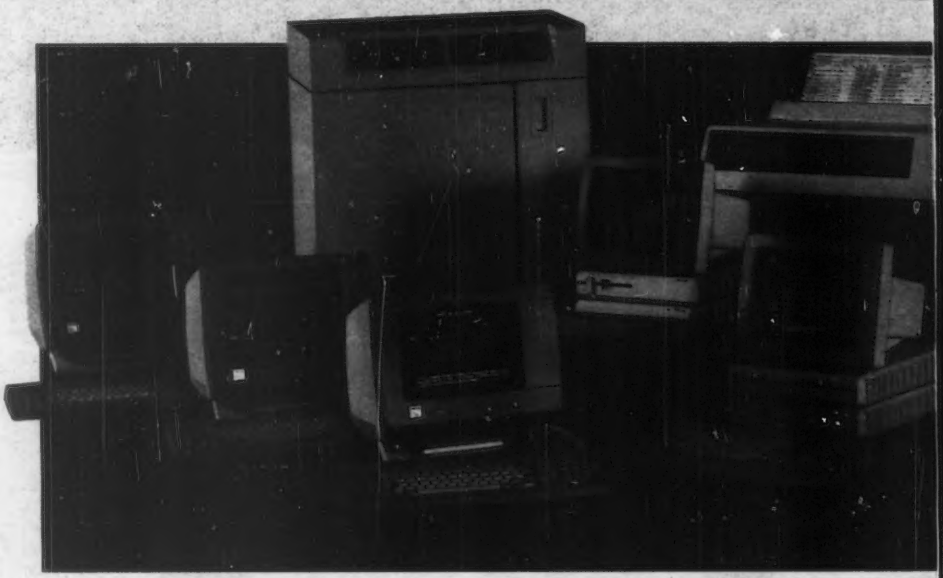
If the purveyors of Unix are to survive, they will need such unity to combat their true competitors: IBM (with whatever opearting system it chooses) and Digital Equipment Corp. (with VMS).

**5. Availability of software.** The advent of a standard operating system naturally prompts a wide range of software applications. In the Unix marketplace, vendors are rapidly expanding their offerings. Because Unix is machine independent, these applications are portable across a wide spectrum of micro, mini and mainframe hardware from a variety of manufacturers.

**6. Hosting other environments.** Recently, vendors have begun to promote environments "on top of" Unix. (A good example of this is Vmark Computer, Inc.'s implementation of Pick Systems' Pick environment on Unix machines.) This trend makes hundreds of additional software applications available to Unix system users.

**7. Workstations.** In the general market, the trend is toward workstations that focus on general-purpose, scientific or administrative applications. More specifically, manufacturers are expending effort to connect these workstations to Unix machines.

*Clark is director of Unix systems marketing for the computer systems division of Gould, Inc., a Unix supermini vendor based in Fort Lauderdale, Fla.*

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But product selection isn't the only choice. Telex displays offer features like color graphics, monochrome or color monitors, and ergonomic tilt/swivel design. There's a selection of keyboards,

Future Unix workstations will feature icons, discipline-specific user interfaces and bit-mapped support for windows. The operating system's malleability makes all these possible.

**8. Computational servers and file servers.** The trend in both is toward greater performance and higher I/O capacities.

- Computational servers. Most computational engines now use some amount of cache memory. Unix-based systems are being developed with added hardware assists, including special floating-point arithmetic, multiplication and vector processing.
- File servers. The focus here is I/O bandwidth. Faster disk controllers that support new, high-performance disk drives are making their way to Unix-based systems.

**9. Networking.** At the system level, the trend is toward integration with a form of distributed Unix. To date, there are three common approaches to distributed computing.

- Network file systems.
- Newcastle connections.
- Streams.

**10. Business arrangements.** The ease of integration with Unix systems has led some large companies to take on the role of integrator. In many cases, these companies do not have the technology in place to address the product needs of Unix system users. The companies do, however, have the marketing savvy, sales forces and distribution channels to make significant Unix-based sales.

> *"Traditional manufacturers' needs for Unix-based systems provide a perfect scenario for the rise of start-up companies."*

Traditional manufacturers' needs for Unix-based systems — coupled with these firms' inability to produce such systems quickly — provide a perfect scenario for the rise of start-up companies. With $5 million to $20 million, a start-up company can quickly develop and manufacture some initial products. It can then sell these products on an OEM basis to a larger, slower moving company better equipped for marketing.

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## VARY from SR/18

well exceed the cost of the larger investment in a more suitable system.

### Making the right choice

How can any user be sure that the right equipment is being purchased? As with anything else, evaluating equipment and software will be an easier task if the user can clearly define and write down what a system must do, how it will be used and the growth that can be expected.

Two more options that can help when evaluting systems are vendor product demonstrations and contacting current users of the systems being considered. If a vendor promises a certain function, have him demonstrate it. Vendors can also provide lists of current users. If you have contacted a vendor for such a list, do not let it choose only satisfied customers. Unhappy customers can be helpful; what makes one user very unhappy can make a second user praise a system.

A clear perspective of the computer industry will help anyone in selecting a supermicro or a minicomputer. Future technological enhancements may make the supermicro work more like a mini, just as the mini may begin to work more like a mainframe.

In this environment, the best defense is a good offense — be very sure of what the system is expected to do today and maybe even as far ahead as next year, but expect your investment in equipment to be obsolete in about a year. Considering the possible replacement factor in your cost/benefit analysis will protect you from any nasty surprises.

## CONTROL from SR/22

through a calculator.

But the first concern — the matter of who is getting at what data — can be centrally controlled through the departmental mini strategy. In accordance with a specific user group's requirements, MIS can devise a series of extracts that offload corporate data, manipulate it into a format that is conducive to efficient access and relocate it to the user department's mini.

Because the nature and timing of the extracts is under MIS control, user-submitted, round-the-clock extracts no longer present a problem. In addition, each extract can be certified — against MIS-defined and MIS-controlled checks and balances — to have executed accurately.

**Improvement in meeting users' needs.** Within this departmental mini strategy, users get access to data that is suited to their unique needs. The benefit to users is obvious, but the MIS department fares equally well.

Different areas of a company typically need data in different formats. Designing an all-purpose data base that meets everyone's needs is a task and a half, even with products flexible enough to accommodate a variety of data access needs.

If the MIS department prepares and delivers data to departmental minis, giving each user group a format that suits specialized requirements, it eliminates the need to obtain a corporate concensus on a mainframe solution.

Special Report

# Third-party service keeps multivendor systems on-line

## Users find offerings convenient, objective and comprehensive

By Rudy Thibodeau
Special to CW‡

Minicomputers have become the target for independent maintenance companies, largely because multivendor hardware configurations have proliferated and because minicomputer vendors have not offered substantial maintenance for such mixed-vendor systems.

A minicomputer vendor's maintenance warranty, for example, is not likely to cover a user's entire configuration unless that configuration consists wholly of the vendor's equipment.

If the vendor's mini is connected to another vendor's printer or tape subsystem, the mini vendor — in extreme cases — may even refuse to perform warranted work until the user disconnects the peripherals.

At the least bothersome end of the spectrum, a user site that contains equipment from several manufacturers will be forced to rely on multiple service sources, an arrangement that complicates maintenance and leads to problems. With multiple service sources, the user's maintenance and administrative costs increase, and the availability of prompt, on-demand service decreases.

Third-party maintenance companies alleviate the problems of multivendor equipment servicing. These companies have the capability to service mixed-vendor equipment, and they can easily tailor maintenance service to the requirements of each user's specific configuration.

Because of the advantages they offer, third-party maintenance services are gaining in importance and popularity. Users, in increasing numbers, are welcoming independent service companies as an effective alternative to other maintenance options.

In a 1983 report, "Third-Party Maintenance of Computers and Data Terminals," Frost & Sullivan, Inc. concluded that most users rated third-party companies' services as highly as or higher than the services provided by equipment manufacturers.

Users also reported that, often, third-party companies were more responsive than equipment vendors and provided more cost-effective service.

The benefits of third-party maintenance fall into three general categories:

- Convenience.
- Objectivity.
- Comprehensiveness.

**Convenience.** Third-party maintenance companies offer one-stop shopping that can significantly reduce a user's administrative workload. Having one source for maintenance eliminates the problems associated with calling, paying and relying on several different manufacturers.

As an added convenience, many third-party maintenance companies are well suited to service remotely located offices and facilities. These companies can usually provide geographic coverage at least as well as equipment manufacturers can.

> *Users reported that, often, third-party companies were more responsive than equipment vendors and provided more cost-effective service.*

Most third-party maintenance companies are organized much as a manufacturer's field service force: They consist of a national network of local field offices staffed with service and customer engineering personnel; these local representatives are supported by regional and national technical and engineering staffs.

**Objectivity.** Independent maintenance companies do not benefit from passing the buck or blaming other vendors' components for a system malfunction, as is often the case with manufacturers' maintenance.

Because of this, third-party maintenance provides users with an objective, thorough approach to equipment service. When a company is responsible for an entire system, it must service the entire system equally; it cannot merely focus on a single system component.

Independent maintenance companies can also provide objective opin-

See **SERVICE** SR/31

*Thibodeau is national account marketing manager for Control Data Corp.'s Engineering Services Division, which is based in Minnetonka, Minn.*

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Special Report

# Users must match needs to service firms' capabilities

Keeping mixed-vendor minicomputer systems up and running is no small undertaking, and obtaining the right kind of service at the optimum cost is a difficult goal to achieve.

A logical approach to saving money and eliminating unnecessary downtime lies in determining the specific maintenance requirements of all facilities and in finding an organization that can effectively address these needs.

Once a shop's requirements have been identified, the manager should ask maintenance organizations to supply written proposals that fully describe service capabilities.

Specifically, the proposals should address the type of equipment the organization services, the response time a user can expect, the maintenance organization's normal working hours and the cost of service after normal working hours.

### Three key resources

In a general sense, users can judge maintenance organizations according to the strength of three key resources: people, parts and depth of service.

**People.** The geographic distribution coupled with the availability of qualified customer service personnel are prime considerations.

Although some maintenance organizations service a wide geographic area, many do not have enough available personnel to service any given area properly.

The service a user would receive from an enormous national field service organization, for example, would be inadequate if that organization only employed one or two technicians in the user's city.

Equally important to the quality of service is the extent to which the maintenance organization trains its field engineers. Because of the rapidly changing computer market and the need to upgrade parts and replace outdated technology, the user must demand that the maintenance organization continually train its customer engineers.

> *In a general sense, users can judge maintenance organizations according to the strength of three key resources: people, parts and depth of service.*

**Parts.** The availability of needed parts or components is another important factor.

A maintenance company cannot possibly stock all possible parts for each customer. It can, however, maintain a reasonable parts inventory that guarantees a high level of customer satisfaction.

**Depth of service.** The depth of service is also a major concern. A user can gauge a maintenance organization's commitment according to whether the organization offers the following two services:

- A hot line. The hot line should ensure speedy responses for emergency calls and should provide a day-to-day source of assistance for less pressing maintenance and technical problems.
- Remote diagnosis. Remote diagnosis is becoming popular as a viable means of troubleshooting; it can eliminate many service calls and cut maintenance costs.

A user should try to find a maintenance organization that provides the service most suited to the needs of the computer system.

— Rudy Thibodeau

## SERVICE from SR/30

ions on equipment acquisitions. An outside service organization will not profit from recommending one manufacturer's equipment over another's. Rather, it will tend to offer more neutral advice than an equipment manufacturer will.

**Comprehensiveness.** Major third-party services usually have an extensive spare parts supply and a distribution system that is large enough to meet a wide variety of minicomputer and peripheral hardware requirements.

The main services these companies offer fall into three categories:

- Preventive maintenance — periodic and planned services, such as replacement of air filters and disk drives.
- Predictable maintenance — replacement of assemblies with known failure rates.
- Remedial maintenance — diagnosis, isolation and repair of malfunctions.

Additional services may include installing equipment, preparing documentation and user training.


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Special Report

# Law firm weighs evidence in choosing OA system

FREDONIA, N.Y. — Careful research led one of the partners at a small law firm toward the verdict that a successful office automation project must be constructed piece by piece around useful software.

Peter Clark, the partner in charge of automating the law firm of Brandt, Laughlin, Schaack, Whipple & Clark, P. C., began his project with little knowledge of computers. "My kids probably know more than I do," he said. But after reading articles about office automation in American Bar Association (ABA) journals and visiting an ABA conference that featured some automated systems in use, Clark had a solid idea of how to begin his search.

"From all I'd read . . . the software was very important," he said. His research convinced him that Brandt Laughlin would be best served by a Unix-based system with components for word processing, accounting and client record keeping. Unix was the only operating system that Clark thought would provide the multiuser capabilities the firm required.

Brandt Laughlin has six attorneys and 10 clerical employees who work out of three offices — the firm's Fredonia headquarters and two branch offices in nearby towns. In its two branch offices, the firm uses dedicated word processing systems. In its headquarters, however, it wanted to integrate word processing and other company tasks on a micro-based system.

Clark chose Unilaw legal software from Guardian Automated Systems, Inc., a Unix software development company, as the basis for the firm's system. The software included a component for time and billing and one for trust accounting and had an interface with word processing.

Clark then looked for hardware on which to run the software. After he considered Unix-based micros from IBM, AT&T and NCR Corp. and dismissed them because of their prices or unavailability, Clark chose a Fortune Systems Corp. XP 30 with a 30M-byte hard disk.

Brandt Laughlin ordered additional software from Guardian, including a University of California at Berkeley 4.3 Unix-like operating system and software packages for word processing, spreadsheets, terminal emulation and payroll.

The system was installed in August 1984. Since then the firm has installed a general ledger package and has subscribed to an on-line legal data base.

The firm followed a similar plan with its hardware and software. It bought basic components and will add to them as needs arise, as employees become comfortable with technology and as money becomes available, he said.

He outlined other attitudes and methods that he said helped Brandt Laughlin make a smooth transition from manual to automated document production and accounting.

> *A set of attitudes and methods helped Brandt Laughlin make a smooth transition from manual to automated operations.*

■ **The clerical staff wanted it.** Clark said one secretary had worked with a word processor at another firm and that the others liked the system because it saved them time on repetitive tasks.

■ **The firm did not try to deal with too much data at once.** Rather than try to put all of its documents onto the system right away, the firm entered forms as it needed to use them. For example, Brandt Laughlin started using the time and billing programs only for clients who were billed hourly. Later, it phased in their use for clients who were billed on a flat rate and those who were billed on a contingency basis.

■ **Automation was presented not as a replacement for all old methods but as a supplement.** The on-line research service, for example, is being used in conjunction with periodicals and other traditional research tools.

■ **The firm's organization remained intact.** The secretary primarily responsible for documents related to matrimonials still worked on them. The people who handled the accounts payable continued to do so.

■ **Good financial planning permitted the firm to absorb the costs of automating.** The equipment and software purchases were modest — totaling only about $30,000 — rather than extravagant. Additional components will be added when needed.

■ **The firm automated only its headquarters.** It plans to link its two branch offices later. That way, Clark said, employees from the Fredonia office can train clerical people at the other sites.


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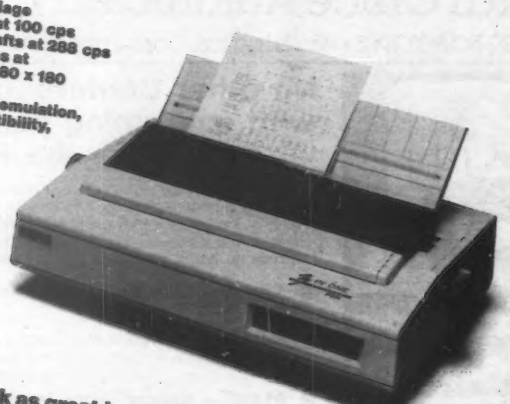

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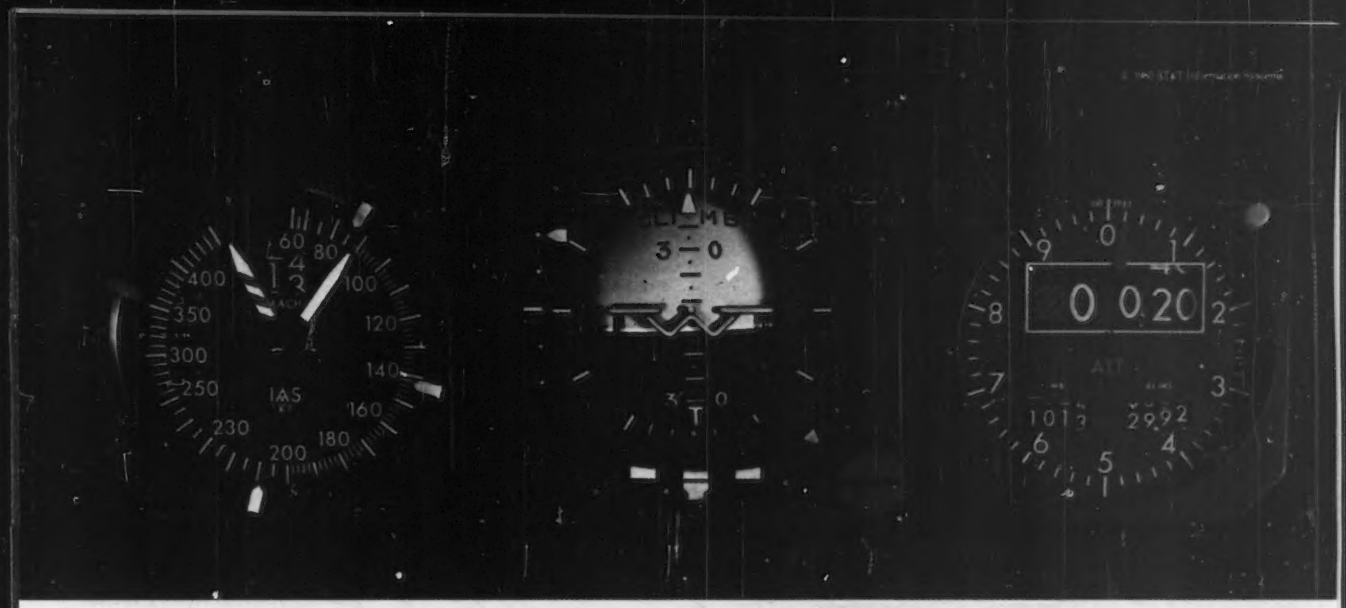


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Special Report

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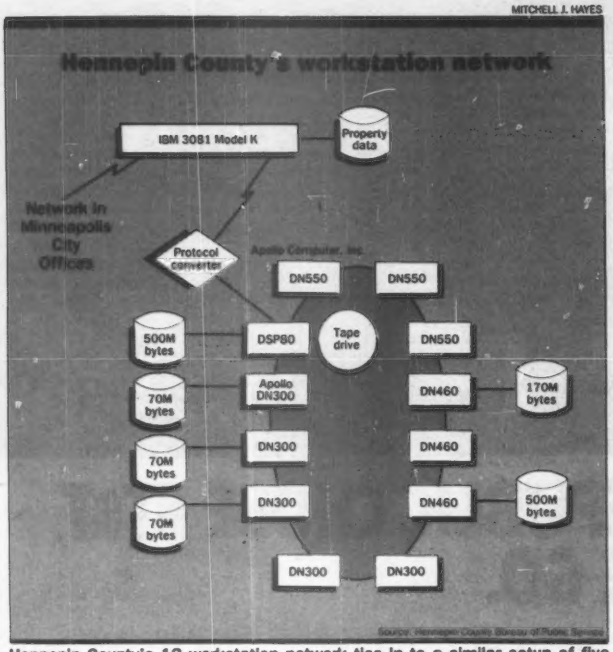


Hennepin County's 12-workstation network ties in to a similar setup of five processors in Minneapolis city offices.

## HENNEPIN from SR/14

duction. With the new system, users can display a map of the entire city of Minneapolis and zoom in to inspect and update details as minute as street signs. Lachinski said users can process a change to a large map within a few seconds — about the same response time required for a change to a small map using the old configuration.

■ The network's data base, Apollo's Domain D3M, allows programmers to compile programs on-line, and jobs submitted by different programmers can run simultaneously. Associated graphics routines, components of Apollo's Graphics Metafile Resource, let developers integrate graphics, text and data into interactive applications. Lachinski said D3M also features fourth-generation capabilities that will help end users work with the completed Ultimap system.

■ Because each workstation on the network now has its own processor, programmers do not have to compete with other users for CPU resources. Lachinski said the microprocessors have less raw power than the mainframe did but can handle the same development processing load because they are dedicated workstations.

■ Processing costs are so low, compared with those from the IBM mainframe, that Hennepin County expects the Apollo workstations to pay for themselves in less than one year once they begin running Ultimap in production, according to Lachinski. Because of this, he said, developers can concentrate less on costs and more on designing efficient systems.

### Want to optimize user productivity

"With 32-bit microprocessor workstations, CPU cost is less of a consideration [than it is with mainframes], so the emphasis has shifted to optimizing user productivity," Lachinski said.

Hennepin County's Ultimap programmers are currently converting the mapping system software from IBM's IMS to Apollo's Domain environment. The 3081 stores graphics data, which programmers download to the Apollo network for conversion then upload back to the mainframe. They transfer files between the two configurations via a protocol converter.

According to Lachinski, the development team expects to take one-half of its work off the IBM mainframe by the end of this year and to complete the conversion six months after that.

## LAMBTON from SR/14

But when staff members began simulating student usage with about 10 machines, they bogged down the network. The current dual-network setup arose as a result. Boyd said he split the network in two so that traffic tie-ups on one network would not impede transmissions on the other.

### Cannot handle students' whims

The single network would probably be able to meet business users' demands, he said, but it could not handle the whims of students. "They're not disciplined at all," he explained. "They will sit for hours and just play, and they will try to bring the system down. They feel it's part of their learning process."

This perception of student habits also forced the school to abandon another planned network feature. When Boyd ordered the Cadmus equipment, he said he had hoped to use it as part of a file-serving scheme. Students would download files from a VAX processor, work with the data on the Cadmus machines and transfer the files back to the VAX for storage.

But the winter tests convinced him such a setup could be disasterous if too many students decided to transfer all their data at the same time. As the network stands now, each student is assigned a home workstation. Each workstation has its own disk drive, with either 60M or 140M bytes of storage, so each student can store data at his home base.

This way, Boyd said, students will transfer themselves across campus to their home workstations instead of transferring data across the network to whatever workstation they want.

With the dual network and local storage, Lambton's computing resource should hold up to the demands of its users, according to Boyd. But until the network survives two semesters of use, especially term-end cramming, he will continue to fear the worst. "I have my fingers crossed," he said.

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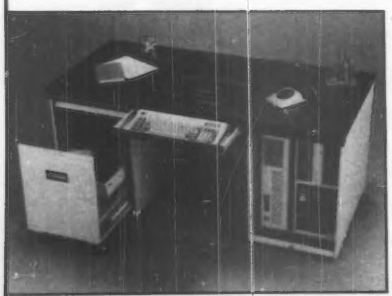

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# MICROCOMPUTERS

**SMALL TALK**
Edward Warner
CW International Editor

## Many thanks to CW readers

As I leave the microcomputer beat at *Computerworld* to become the paper's International Editor, I want to say goodbye — at least for now — to a number of people who have, in time of need, given me good story ideas or quotes. In many cases they had no self-serving reason to call. Others have spent much valuable time on the phone with me in an interview. Sometimes, they even risked their jobs.

I would also, however, like to say an "ungoodbye" to those few who infest the otherwise-respectable field of public relations, denigrating its image while giving me a headache.

But first the good news.

An example of the helpfulness of our readership — especially those microcomputer managers and users out there — comes in response to a recent column that I wrote about my unfruitful search for business users of the AT&T Unix PC. At the end of that column, I asked the readers to call me if they knew of anyone using the machine. I received more than 30 phone calls. True, some were from dealers, but most appeared to have come from readers who had nothing to gain — except the good feeling of having lent a hand.

Another example comes to mind: A microcomputer manager with an oil company recently called to tell me his thoughts on site licensing of personal computer software and how his firm has just concluded such an agreement. A good story resulted, one that may have benefited other microcomputer managers.

Unfortunately, I have since heard that the kind soul who gave me the

Continued on page 71

# DSS sidesteps DP logjam

## Tools boost users' power; ease of use called crucial

**By John Desmond**

DALLAS — Decision support software (DSS) is becoming known for its ability to enable personal computer users to perform a variety of analyses using simple programs, while skirting the central MIS waiting line for applications. This is the consensus reached by two speakers at a session on DSS at the Software/Expo conference earlier this month.

But for DSS software to make it on personal computers, DSS products must be easy to use as well as effective, one speaker noted. "The financial modeling capability of this type of system depends on its ease of use," said Jeffrey A. Schackor, director of financial and business analysis for Healthone Corp. of Minneapolis.

Schackor addressed how a DSS system is being developed at Healthone, a health care conglomerate with four hospitals, health maintenance organizations, a home health organization and an ambulance service. The firm had a revenue of $180 million in 1984.

At Healthone, Schackor said, a financial modeling program is being developed because, "We need to know our financial situation at any point in time. We want a system to project financial performance for three to five years."

If a health maintenance organization approaches his organization about using a Healthone hospital for its members, Schackor said, "You have no idea what that means unless you can model the impact on the whole system. And I can't afford to a have a 50-man analysis department. We need a program that can produce reports quickly."

A final decision has yet to be made, but Schackor said he is leaning toward a personal computer-based DSS for Healthone.

Rusty Luhring, president of Ferox Microsystems, Inc., presented five examples of how DSS is being used on personal computers. Ferox markets a DSS application development system dubbed Encore.

Continued on page 69

# Microsoft enhances Multiplan

Microsoft Corp. has unveiled an enhanced version of its IBM Personal Computer spreadsheet, Multiplan, shipping about the same time as Version 2 of Lotus Development Corp.'s 1-2-3.

Microsoft also announced Cobol Tools, its first productivity software package for Cobol programmers. The software, available for Microsoft MS-DOS or Xenix environments, will be shipped in October.

Multiplan Version 2, which will be available next month from Bellevue, Wash.-based Microsoft, is said to offer faster calculation speed by supporting the Intel Corp. 8087 and 80287 math coprocessor chips. Other reported enhancements to Microsoft's software are larger work sheet size, capability for keyboard macros, mouse support and the ability to read and write to files created with 1-2-3.

Like the new version of 1-2-3, Multiplan Version 2 uses a sparse cell memory management scheme to allocate memory only to work sheet cells that are filled. The more efficient use of memory allows Multiplan to accommodate spreadsheets with up to 4,095 rows and 255 columns.

The new version also prioritizes recalculations to handle the calculation of the on-screen cells first for greater speed.

Multiplan's compatibility with spreadsheet market leader 1-2-3, a first for the Microsoft package, will reportedly allow users to transfer values as well as formulas between the two spreadsheets. The new version also links with Microsoft Chart to provide real-time changes in the graphics presentation software when Multiplan figures are changed.

The keyboard macros in Multiplan 2 can be used for common procedures such as work sheet printing or more complex tasks such as creating customized applications.

Continued on page 71

■ Pick Systems will introduce next month two versions of its Pick operating system for the IBM Personal Computer AT/**62**

■ Timelock Software has announced its IBM Personal Computer security systems/**65**

■ Nardoni Associates has unveiled a microcomputer human resource package/**69**

**INSIDE**

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# Future to bring price erosion to micro software mart

## Management control expected to diminish

By Susan Blakeney

MIAMI — The short-term future will bring tremendous price erosion in the personal computer software market and, in the longer term, a loss of control for DP managers over end-user computing.

Those were some of the predictions voiced earlier this month by industry experts at Link Resources Corp.'s "Marketing The New Technologies" conference. Link, a New York-based market research firm specializing in telecommunications technologies, is a subsidiary of International Data Corp.

During one session a panel of microcomputer industry personalities expressed their opinions on upcoming changes in data processing. One change, according to Stewart Alsop, publisher of "P.C. Letter," a biweekly newsletter on the personal computer industry, will be that "large computer centers will evolve to service departments. They will be transparent to users. End users will not be controlled by them."

The personal computer user of the future will likely use an Apple Computer, Inc. Macintosh, Alsop said. "IBM [Personal Computers] are just too complicated; they give the user too many choices," he said. "That's why the Macintosh is successful. It's operating environment is so easy to use."

Alsop said products and trends to watch for include Microsoft, Inc.'s Excel spreadsheet, which runs on Apple Computer, Inc.'s Macintosh. "Excell will give Lotus Development Corp. problems," Alsop said.

Other products Alsop said to look for include data base and file managers from Symantec Corp. and Ansa Corp. for the IBM Personal Computer and a package called Ready from Living Videotext, also aimed at Personal Computer users, that will be released at the end of the month. Ready, a memory-resident desk accessory, produces outlines for the user, Alsop said.

He also told his audience to watch for personal productivity packages that are task specific and will include drafting, typography and melding functions. Alsop said he expected laser printers to come down in price before anything major happens in word processing.

Eric Bedell, product marketing manager for Lotus' Jazz, maintained that the gloom and doom prevailing in the industry is really a "moment of digestion." Bedell, however, predicted coming challenges in the distribution arena and said presales seminars for users will be more widely practiced.

Bedell also compared the future of personal computer software to frozen food: each emphasizes speed, personal productivity, easy access and, last but not least, content.

Jim Johnson, president of Human Edge Software Corp., said "tremendous price erosion will occur during the next few years" thanks to agressive companies like Borland International and DAC Software, Inc. He warned, however, that pricing on Lotus' 1-2-3 along with Ashton-Tate's Dbase III would remain high because nobody appears able to offer a comparable product.

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# Pick to launch system versions for IBM micro

Pick Systems, located in Irvine, Calif., is scheduled to introduce next month two versions of its Pick operating system for the IBM Personal Computer AT.

One version reportedly will support up to three users, and the second will work with up to six users. The Pick operating system, in use on 27 different computers from low-end mainframes to the IBM Personal Computer XT, will include in its AT version a bridge to the IBM PC-DOS operating system, permitting users to move files between the two operating systems, according to Frank Petyak, Pick national marketing manager.

Other features of the Pick Personal Computer AT System include support for a streaming cartridge backup system, a bundled applications generator and compatibility with all other Pick systems. The latter feature means that users will be able to take "an application on an [IBM] 4300 and run it on the AT," according to Petyak.

### Multiport cards supported

To gain the extra serial ports needed to support additional users, the Pick Personal Computer AT System will support multiport cards from AST Research, Inc.; Arnet Controls, Inc.; and Digigraphics, Inc., Petyak reported.

The three-user support version of Pick for the AT is priced at $795, and the six-user support version is priced at $995.

Both will debut in mid-October, Petyak said.

# Intel introduces supermicro, board-level products

Intel Corp. of Santa Clara, Calif., has announced a new supermicrocomputer and several board-level products that are based on an 8-MHz version of the Intel 80286 microprocessor.

The products consist of two CPU boards and four memory expansion boards, feature immediate memory access and operate with the vendor's Irmx 286 operating system.

With the addition of the real-time Irmx 286, supporting up to 16M bytes of memory, the System 310AP is targeted for industrial and communications applications such as process control, data acquisition, robotics, protocol conversion and automated testing.

**Memory, speed improvements**

The System 310AP supermicro is said to offer substantial memory and speed improvements over the Intel 310, with performance comparable to the Digital Equipment Corp. VAX-11/780 mini. The 310AP supports applications previously written for Irmx 86 running on the 310.

The basic configuration includes the Multibus I bus architecture (IEEE Standard 796); the Intel 8-MHz, 80287 math coprocessor; a 320K-byte, 5¼-in. floppy disk drive; support for a 60M-byte, ¼-in. streaming tape drive; two serial ports; and one parallel port.

The 310AP line includes systems with up to 16M bytes of random-access memory (RAM); up to 420M bytes of unformatted hard-disk storage in increments of 19M bytes, 40M bytes and 140M bytes; and up to 16 ports.

The basic configuration is priced at $8,125.

The ISBC 286/10A CPU board includes an 8-MHz 80286 and a socket for an Intel 80287 coprocessor, 512K bytes of local memory and 128K bytes of dual-port memory. It is intended for erasable programmable read-only memory applications and sells for $2,600.

The ISBC 286/12, intended for RAM applications, contains 1M byte of dual-port, immediate-access RAM. The board also includes the 8-MHz 80286 and a socket for the 80287, as well as a socket for the Intel 82258 advanced direct memory access microcontroller. It costs $4,715.

Both CPU boards can reportedly be configured to gain access to memory through the iLBX local bus extension or through a synchronous bus interface.

The EX series of memory boards offers access memory transfer through a new synchronous bus and supports byte parity-error detection. The top of the line, the ISBC 040/EX, priced at $7,500, is said to be the first Multibus I board to offer 4M-byte capacity.

The other boards are the 500K-byte 012/EX for $1,800, the 1M-byte 010/EX for $2,700 and the 2M-byte 020/EX for $4,335.

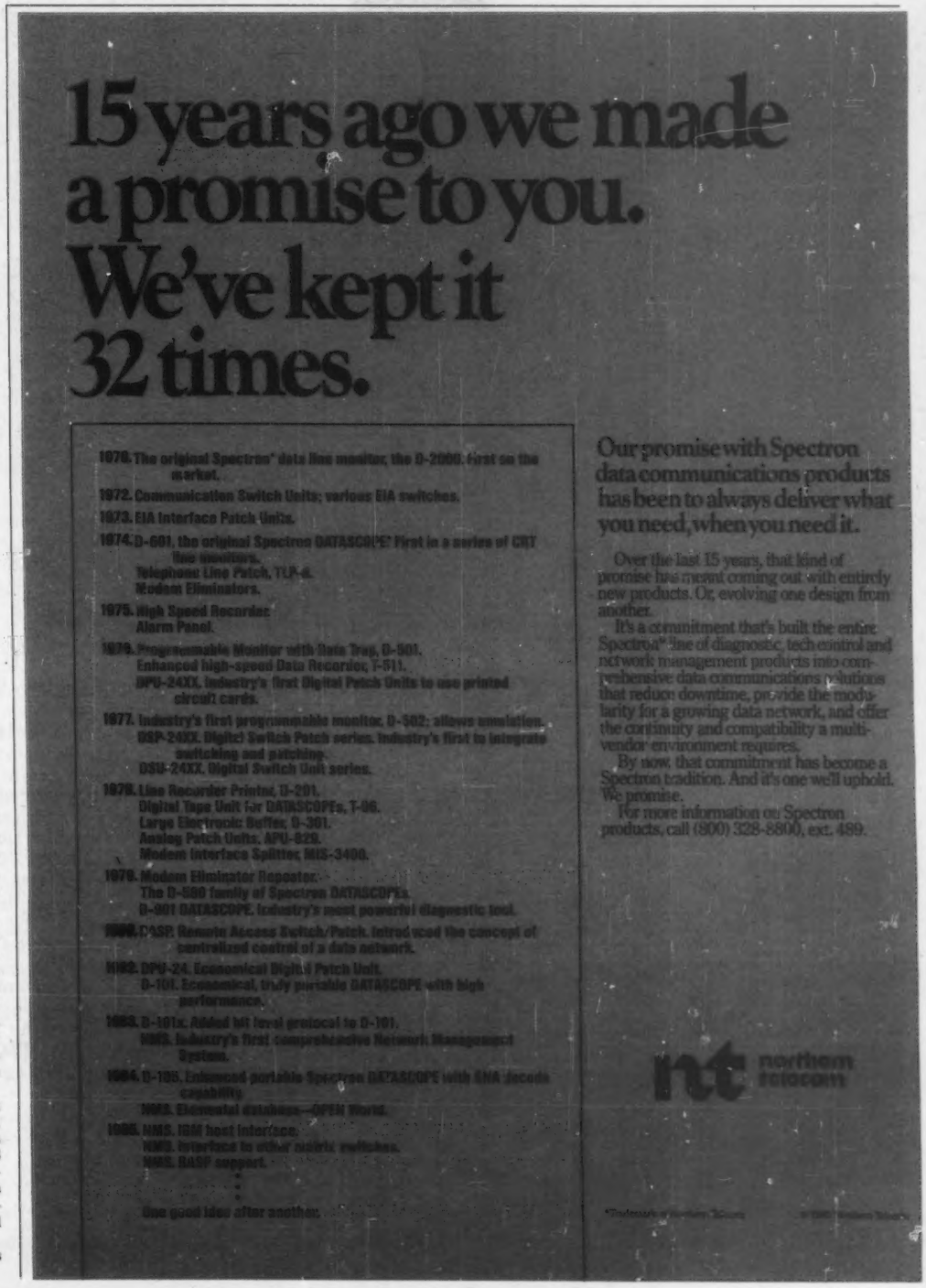
# Isdos micro tool debuts

Isdos, Inc. of Ann Arbor, Mich., has introduced a software program that automates the Yourdon/Demarco system development methodology of structured analysis, which programmers and analysts often use.

Structured Architect features graphics representations of data flow diagrams and the validation and verification of analyst models. The package's data dictionary documents interface flows and data stored in data flow diagrams and specific processes represented in the data flow diagram.

The software runs on an IBM Personal Computer with 256K bytes of random-access memory and IBM's PC-DOS operating system. The package supports graphics boards from a number of manufacturers including IBM and Tecmar, Inc.

Structured Architect costs $3,500.



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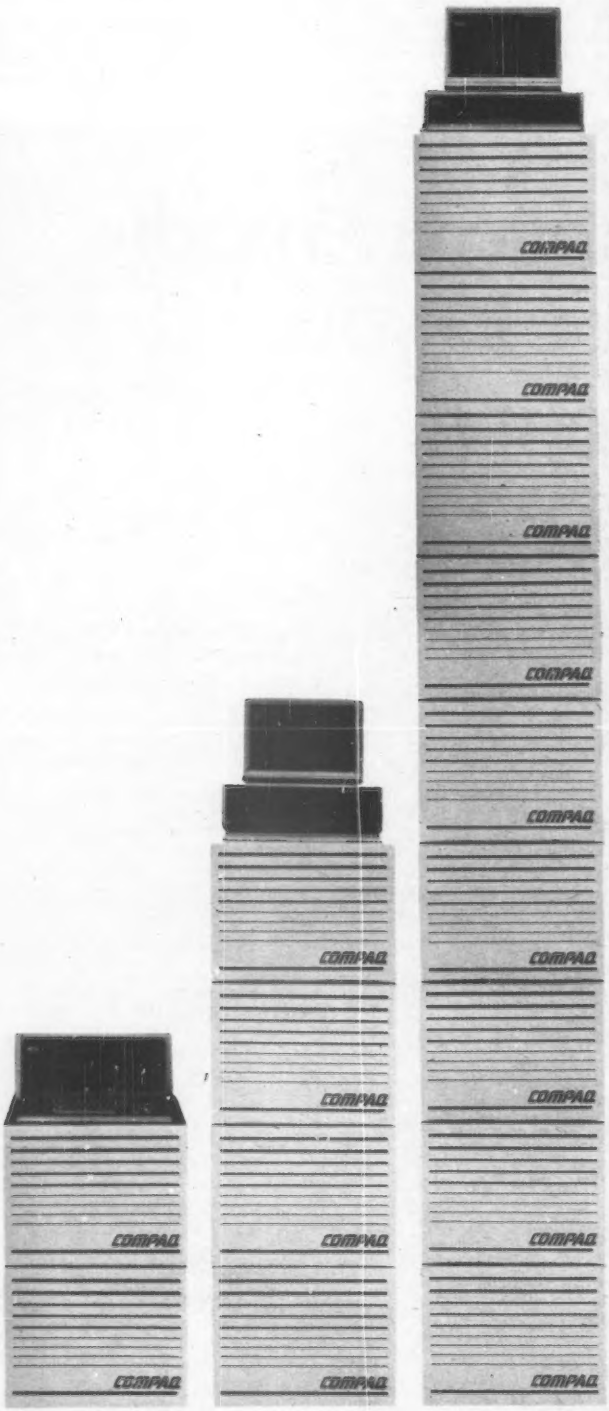


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# Motorola expansion card bows

Motorola Semiconductor Products, Inc. of Phoenix has introduced an expansion card that reportedly allows an IBM Personal Computer with a 10M-byte hard disk to serve as a multiprocessor host for AT&T Unix-like applications.

The plug-in module, PC/68000, is based on the Motorola, Inc. MC68000 microprocessor.

It is said to run Motorola's Unix-like System V/68 operating system and provide transfer capabilities between that system and IBM's PC-DOS.

The product reportedly supplies an IBM microcomputer with development capabilities similar to those for Motorola HDS-200 or HDS-300 development workstations.

Buffering and cache memory reportedly allow the 68000 processor to run independently of the I/O functions of the Intel Corp. 8088 or 80286 chip within the IBM Personal Computer.

The user can switch between the System V/68 and PC-DOS with two keystrokes, the company said.

The PC/68000 includes the 10-MHz MC68000, cache memory, 2M-byte dual-ported random-access memory and the System V/68 software.

The module is available for $4,500, according to the vendor.

# Ashton-Tate on-line data support out

Ashton-Tate of Culver City, Calif., has become the first software company to offer on-line technical support services to its customers via One Point, a Walnut Creek, Calif., on-line data base vendor.

Ashton-Tate has furnished the One Point data base with product descriptions, reference notes, product upgrades, samples and product announcements.

Questions that cannot be answered by the data base information can be sent to Ashton-Tate via electronic mail for a quick reply.

Users access the information through the One Point Computer Information Network that runs on Tymshare, Inc.'s Tymnet.

Usage fees for the service are $40 per hour.

# Timelock unveils IBM micro security system

Timelock Software, Inc. in Huntington Station, N.Y., has introduced its Timelock Security System for use on IBM Personal Computers with attached hard-disk storage units.

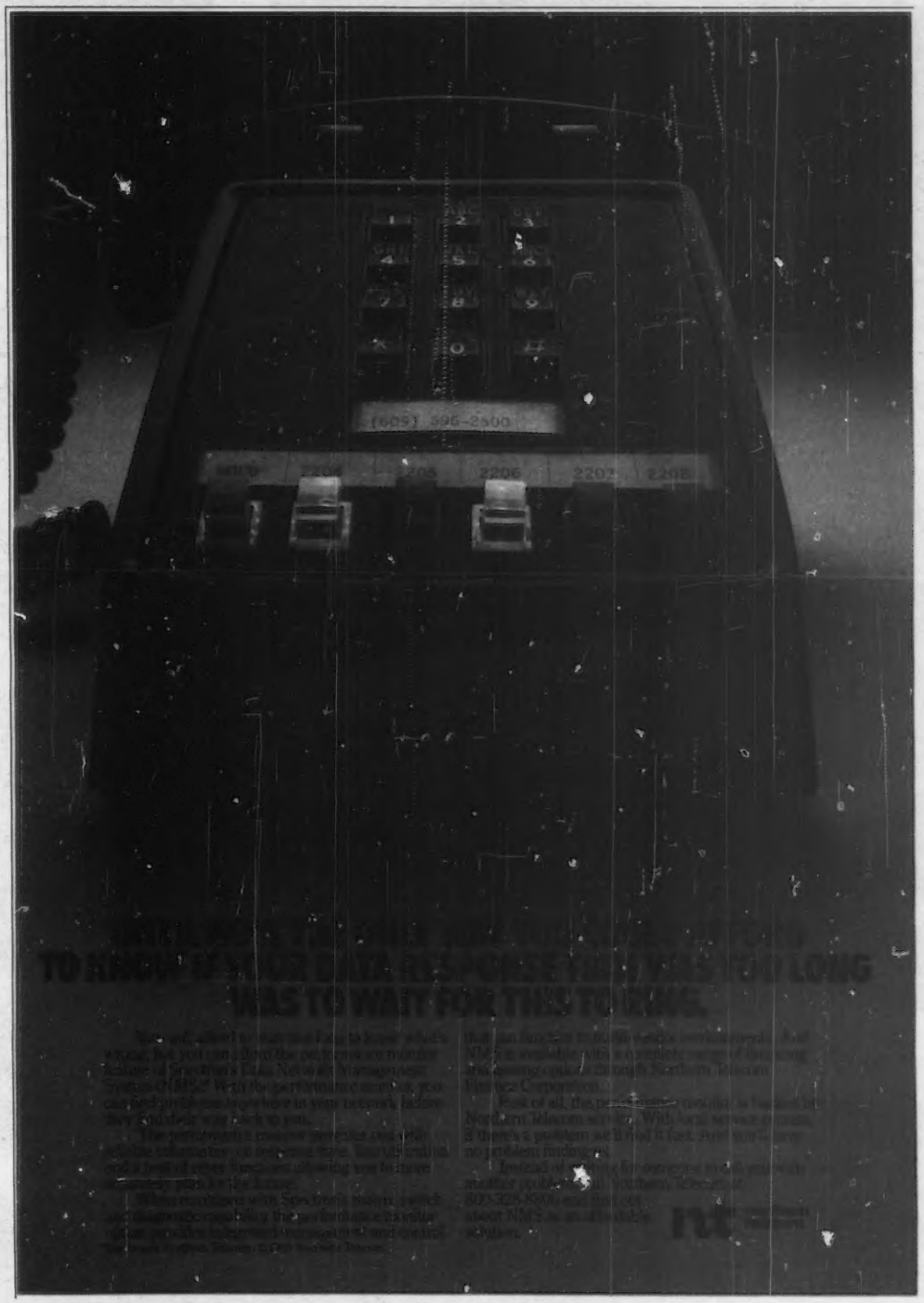
Timelock, a hardware/software product, includes a business-card-size plug that must be inserted into the computer's external parallel port, in line with the printer cable, before users can boot the computer from the hard disk.

The product's software, meanwhile, resides on the computer's hard disk. The software limits access to the computer to those who have the correct password.

After three attempts, an alarm sounds and the computer locks out any further attempts to access it, Timelock said.

A corporate version of the product is also available. The software in that version is reportedly custom written for each corporate customer. Also included in the corporate version are skeleton keys, plugs that can access all of the customer's hard disks, permitting a security officer to boot a hard disk-equipped computer for a user who has forgotten his plug.

The Timelock Security System, available now, has a retail price of $350. Its corporate version is priced at $14,050 and includes two skeleton key plugs, 100 software licenses, 25 security plugs and documentation.



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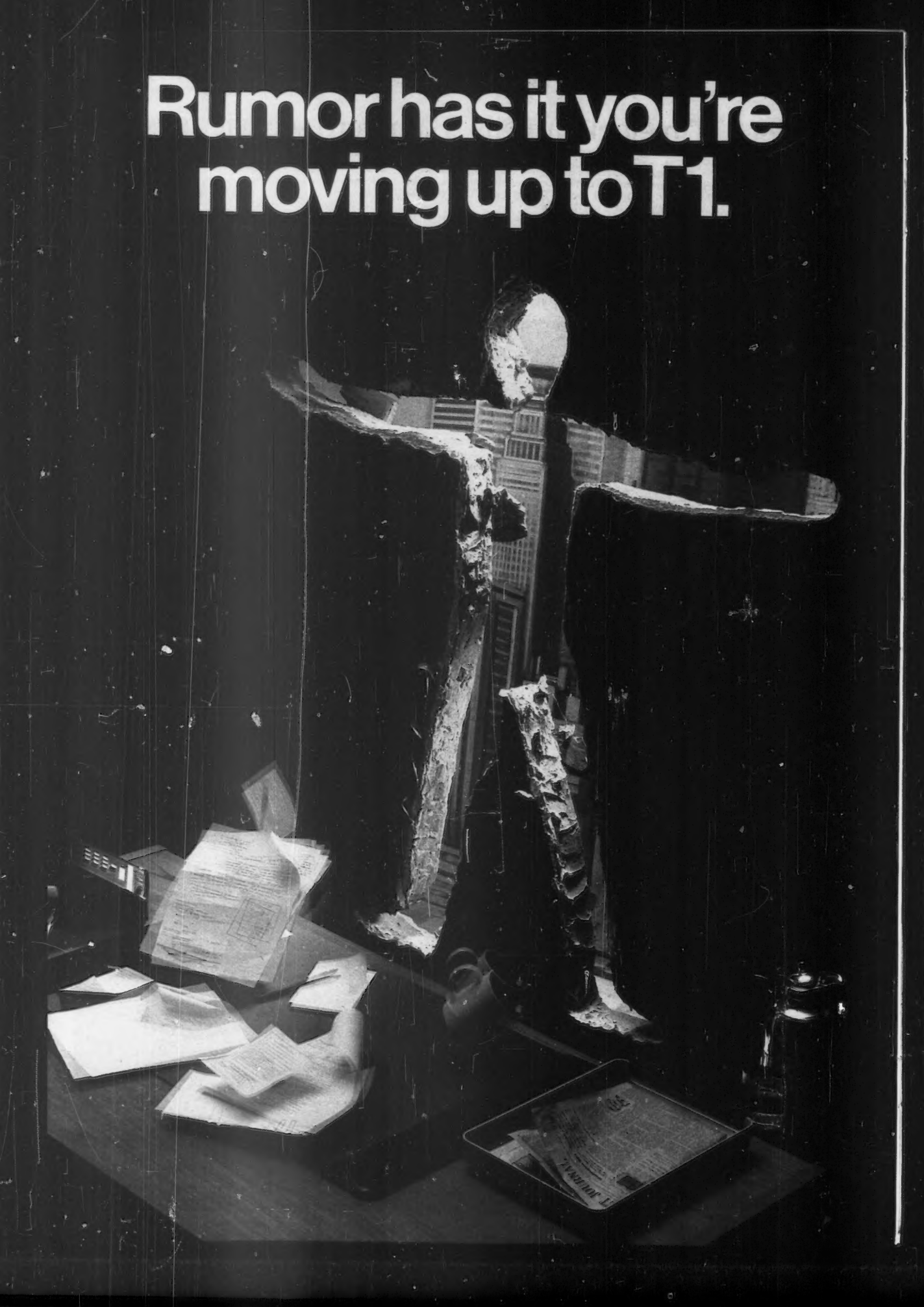

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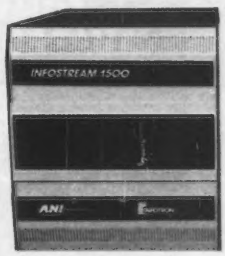


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| 8:30 | Coffee and Registration |
| 9:00 | Seven Keys to Control |
| 10:15 | Break |
| 10:30 | Taking Charge of Your Data Center |
| 12:00 noon | Complimentary Lunch |
| 1:00-4:00 | User Workshop (non-users welcome as well!) |

## SEMINAR DATES AND LOCATIONS

| | |
|---|---|
| Boston, MA | Oct. 18 |
| Chicago, IL | Oct. 23 |
| Columbus, OH | Sept. 18 |
| Dallas, TX | Oct. 7 |
| Detroit, MI | Oct. 16 |
| Houston, TX | Oct. 8 |
| Los Angeles, CA | Sept. 24 |
| Milwaukee, WI | Oct. 10 |
| New York, NY | Oct. 3 |
| Orlando, FL | Oct. 21 |
| Philadelphia, PA | Sept. 30 |
| Pittsburgh, PA | Oct. 29 |
| St. Louis, MO | Oct. 7 |
| San Diego, CA | Sept. 23 |
| San Francisco, CA | Sept. 26 |
| Seattle, WA | Nov. 1 |
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# Human resource system out for IBM, AT&T micros

Nardoni Associates, Inc. of Whitehouse Station, N.J., has unwrapped the Microcomputer Personnel System, a stand-alone human resource information system that runs under IBM PC-DOS 2 on the IBM Personal Computer AT, XT, AT&T PC 6300 and any IBM-compatible microcomputer with a hard disk drive.

The Microcomputer Personnel System's data base design features include more than 650 unique data elements, 20 expansion fields related to personnel functions, 40 reference tables, more than 70 display screens, 25 personnel management reports and a two-level report generator, according to the vendor.

Reports are said to cover such areas as salary and wage issues, applicant flow, tuition refunds, medical claims, labor relations, employee benefits, attendance control, skills utilization, management selection, education and training, appraisals and employee history.

**Security feature controls access**

A security feature controls system access by signon, menu and data element read-and-write limitations controlled by the personnel department, according to a Nardoni Associates spokesman.

The Microcomputer Personnel System can interface to word processing packages and can be configured with optional communications modules that make the microcomputer function as a terminal workstation for communication between other microcomputers or mainframes, the spokesman added.

A single-user license costs $9,500.

## BOARD-LEVEL DEVICES

**■ Bit 3 Computer Corp. has introduced The Adapter, which reportedly allows the IBM Personal Computer AT to appear as another processor on systems using the Intel Corp. Multibus.**

The product, which consists of two cards interconnected by cables, is said to provide the full resources of the Personal Computer AT for use as a bus master in Multibus applications. This configuration allows the AT to use a variety of graphics, array processors, large disks and high-performance processors compatible with Multibus, the vendor said.

In Multibus applications using The Adapter, the AT reportedly can function as a pre-, post- or coprocessor.

The Adapter is priced at $1,175.

*Bit 3 Computer, 8120 Penn Ave. S., Minneapolis, Minn. 55431.*

**■ STB Systems, Inc. has introduced a memory expansion board for use with the Lotus Development Corp. and Intel Corp. Expanded Memory Specification.**

The Memory Companion/PC will give the IBM Personal Computer XT and compatibles access to up to 2M bytes of additional memory. Up to four Memory Companion/PC boards can be installed in a system for a maximum of 8M bytes of memory, the vendor said.

The board reportedly is compatible with Lotus' Symphony 1.1 release.

The 64K-byte Memory Companion/PC costs $349. The 256K-byte version costs $395.

*STB Systems, Suite 125, 601 N. Glenville, Richardson, Texas 75081.*

**■ Ideassociates, Inc. has announced a multifunction add-on board for the IBM Personal Computer AT.**

The Idea Supermax reportedly includes two serial ports, one parallel port and memory expansion capabili-

Continued on page 70

From page 61

## DSS sidesteps DP logjam

DSS is commonly used today for financial modeling and budgeting, often to help make decisions on whether to go forward with a project or acquisition or even to hire or promote personnel, Luhring said. DSS on the personal computer allows the evaluation of more alternatives more quickly than mainframe modeling programs typically allow, he said.

In addition, "The ability to change the format of the information for an analysis is put directly into the hands of the decision maker," he said.

Bicks Pickles of Scarborough, Ont., Canada, which has captured 54% of the Canadian pickle market with more than 300 products, needed a modeling program to project profits. The firm's MIS department said the necessary application would take two years to develop, and they recommended not doing it on a personal computer. The DSS proponents ignored the advice and developed the application on a Compaq Computer Corp. micro with a 10M-byte hard disk. The application was developed in about six months, Luhring said.

The First National Bank of Chicago, the 10th largest U.S. bank, was experiencing a high rate of loan defaults and was looking for a system to help evaluate credit risks. The company made an initial decision to go with a personal computer-based DSS project, putting nearly 7,000 historical financial statements on five micros, each with a 30M-byte hard disk. Loan officer support teams can now perform analyses without special expertise using the modeling program, Luhring said.

Western Digital Corp., a Silicon Valley electronics manufacturer, wanted management reports from its general ledger software running on a Hewlett-Packard Co. 3000 minicomputer. "But it took two weeks to get charts" after a request was submitted, Luhring said. So a team wrote a program to extract needed data from the HP 3000 and download it to a personal computer. Now, the company gets 48 monthly report graphs in an hour and a half, he said.

The World Bank/ International Finance Corp. in Washington, D.C., which makes loans for development projects worldwide, was either performing its number crunching in the field or bringing data back to Washington, D.C., for processing. Because the central DP department was "very bureaucratic and strongly centralized," Luhring said, the bank developed a DSS program for personal computers. Now, World Bank financial analysts carry their micros with them to perform analyses on site.

The American Express Co.'s Travelers Cheque's division, which issues checks for use anywhere in the world, developed a DSS application to analyze quickly the impact of daily changes in currency values. Data from around the world is sent to the company's mainframe in New York, from which it is downloaded to a personal computer where the information is consolidated and the currency conversions are performed, Luhring said.

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## MICROCOMPUTERS

Continued from page 69

ty up to 4M bytes. The basic Supermax "bare board" can be expanded to 1.5M bytes with 64K-bit random-access memory (RAM) chip and to 4M bytes with 256K-bit RAM chips and an additional piggyback board.

Cost of the Idea Supermax ranges from $495 for a bare board to $3,795 for a board with 4M bytes of memory.

*Ideassociates, 35 Dunham Road, Billerica, Mass. 01821.*

■ **Micray Electronics Ltd. has announced a package that reportedly increases the performance of an IBM Personal Computer AT equipped with Intel Corp. 80286 and 80287 microprocessors by up to 40%.**

The package features an automatic self-optimizing clock that drives an 80287 at its maximum speed, increasing the coprocessor's performance by up to 75%, the vendor said. The product consists of a printed circuit card that fits into an 80287 socket.

AT Booster, which includes operating and diagnostic software, costs $349.

*Micray Electronics, Bay 1, 4001A 19th St. N.E., Calgary, Alta., Canada T2E 6X8.*

■ **Earth Computers has unveiled Turboaccel-286, an expansion board that provides an IBM Personal Computer with an Intel Corp. 80286 microprocessor.**

The board features 512K bytes of random-access memory, an optional 80287 coprocessor and the ability to switch to an Intel 8088 microprocessor.

The product uses a custom very large-scale integration chip that emulates 8088 signals and is software transparent, according to the vendor.

With the product, an 80286 microprocessor can directly execute a Personal Computer's Bios and PC-DOS operating system.

Turboaccel-286 costs $995.

*Earth Computers, Box 8067, Fountain Valley, Calif. 92728.*

■ **Checkmate Technology has unveiled a 16-bit microprocessor-based expansion card for the Apple Computer, Inc. Apple II series computers.**

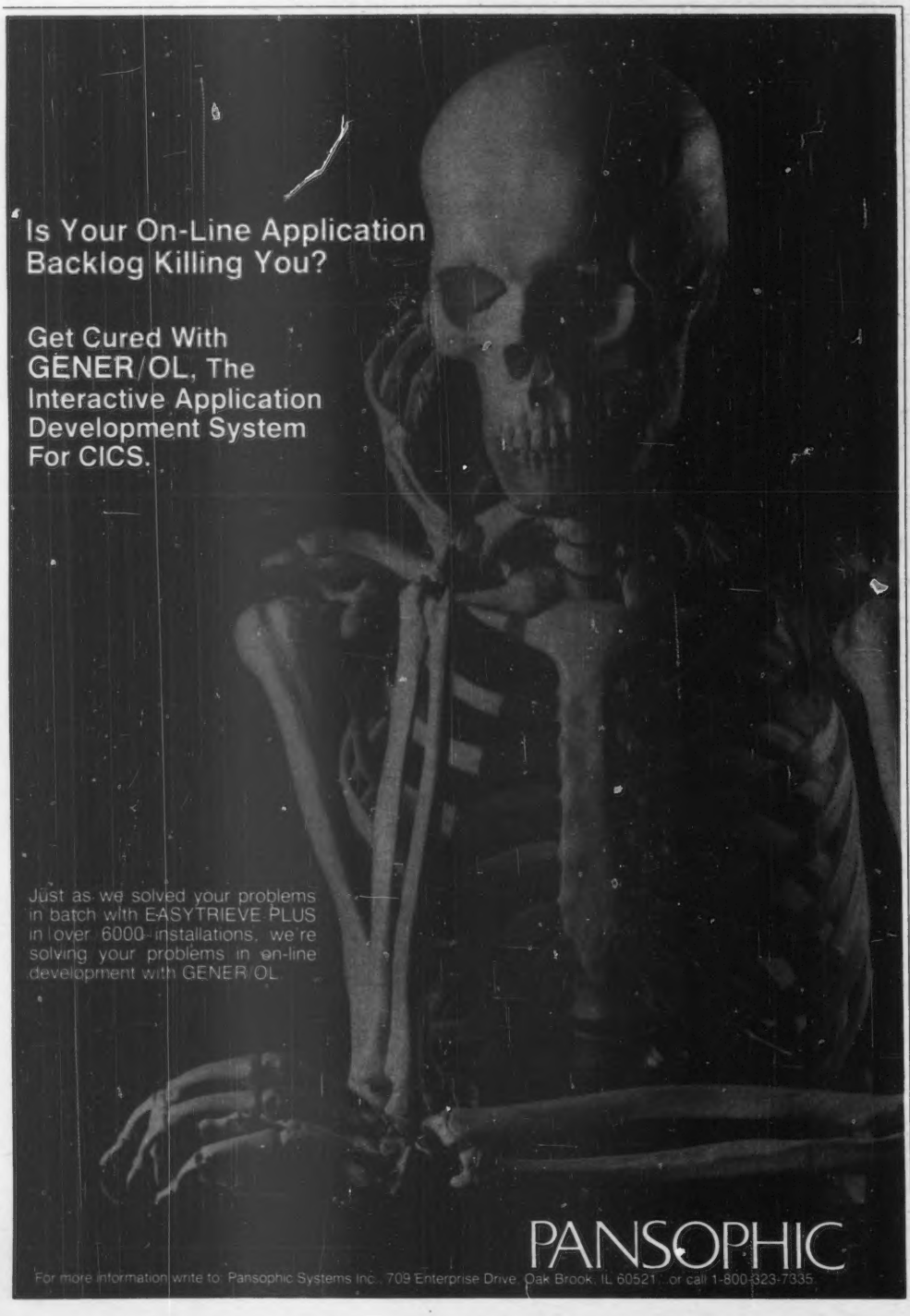
The Multiram CX contains Motorola, Inc.'s 16-bit 65C816 microprocessor chip and the Micro Magic, Inc. MAX-OS operating system, which offers multiuser, multitasking capabilities.

The Multiram CX is said to select automatically the proper microprocessor for each Apple software application, allowing use of both 8-bit- and 16-bit-based software. The board contains 256K bytes of random-access memory.

The Multiram CX card for the IIc plugs into a socket on the motherboard after removal of the microchip. The card plugs into an expansion slot in the IIe.

The card, including the MAX-OS software, is priced at $329.95. A 16-bit CX kit option, which contains the operating system in disk version, sells for $149.95.

*Checkmate Technology, 509 S. Rockford Drive, Tempe, Ariz. 85821.*




## AUXILIARY EQUIPMENT

■ **Dialogic Corp. has added software support to its voice I/O systems to enable IBM Personal Computer, Personal Computer XT, AT and 3270 Personal Computers to record, play back, send and receive voice messages over an IBM Personal Services network running Distributed Office Support Systems.**

Users can record or play back messages using a standard microphone and loudspeaker or by interfacing to the handset of a modular telephone with a Dialogic THI-1 telephone handset interface, the vendor said.

The Personal Voice Messenger software provides an audio services menu and function-key-driven facilities for recording, playing back, sending and receiving messages. Voice files appear in a window.

Priced at $25 for a single-user license, Personal Voice Messenger software runs with one of the vendor's voice I/O systems.

They are Dialog/1, Dialog/2 and Dialog/3, which cost $295, $495 and $595, respectively. The THI-1 telephone handset interface sells for $30.

*Dialogic, 60 Baldwin Road, Parsippany, N.J. 07054.*

From page 61

## Many thanks to CW readers

story idea is now in hot water with his employer for having talked with the press — even though no proprietary information was revealed. He, like many others, had no need to help me, but, in doing so, he helped many. I hope his employer goes easy on him.

**Now for the bad news**

As for the bad news, well, there is thankfully less of it, though some equals in its outrageousness the helpfulness and courage of some of my sources.

Certainly *Computerworld* gets more phone calls from public relations professionals than it does from its readers. When PR people call from out of the blue, they most often call to sell us on something: a story idea about their employer or client. The irony of this is that when I call these same people for a comment on a story which they didn't ask me to do — some news about a bad fourth quarter — they often slither into the woodwork and escape with "I'll have to get back to you on this." For them, tomorrow apparently never comes.

Also a number of calls regard the most insignificant things — "Did you receive our press release on our new agreement to sell diskettes in Alabama retail stores?" — and they come on the two days of the week that are our busiest — Tuesday and Wednesday.

**Prefer calling to writing**

The fact that many public relations people prefer to call, rather than write a letter, leads me to wonder if they really don't want to put in writing what they could later deny having said.

Typical of this is the situation that developed with a new Cambridge, Mass.-based software vendor, which was, according to its PR agency, giving a "de facto introduction" of its much-awaited first product. The vendor's in-house spokeswoman had a slightly different story: She said the product was not really being introduced at all: it was "being trickled out" to members of the press in one-on-one demonstrations.

I got a demo but afterward was treated to a bit of hucksterism that would have made P. T. Barnum flinch. The product isn't being introduced, I was told, but we want you to write about it now, without mentioning the words "introduced" or "announced" in your story. That way, they figured, they could get even more press when the product was actually "introduced" later this year. I would have expected such tactics were I shopping for a used car; I didn't expect them from so-called professionals.

If I get outraged at the way in which some public relations workers play loose with the truth, it's only because I've been pampered by some sources who have always leveled with me, even when they were busy with a thousand other matters. To them I say, "Thanks."

As for those members of the public relations trade who check their scruples at the office door, I have a big "no comment."

From page 61

## Microsoft enhances Multiplan

Another capability, model consolidation, allows the user to combine multiple worksheets into a separate summary one at a time or in batches.

The software requires DOS 1.1 or higher, 128K bytes of random-access memory (RAM) and one double-sided disk drive. Use of the optional Microsoft Mouse supported by the Multiplan Version 2 also requires Microsoft Mouse Version 2 or higher.

Multiplan Version 2 is priced at $195. Upgrades for current users of Microsoft Multiplan 1.2, IBM Multiplan or Texas Instruments, Inc. Multiplan cost $50.

The MS-DOS version of Cobol Tools requires the new version of Microsoft's MS-DOS-based Cobol Compiler, Version 2.1, also to be shipped in October. The Xenix version runs with Xenix Cobol.

Both versions are reportedly source code compatible, allowing users to port Cobol applications between MS-DOS and Xenix.

MS-DOS Cobol Tools requires 256K bytes of RAM, MS-DOS 2 or higher, one double-sided disk drive and the vendor's Cobol Compiler 2.1, which requires 192K bytes of RAM.

Xenix Cobol Tools requires Xenix 1286, Xenix Cobol, a 256K-byte RAM and one double-sided disk drive.

MS-DOS Cobol Tools sells for $350, and Cobol Compiler 2.1 costs $750. The upgrade cost is $50 for users of Cobol Compiler 2.1 and $150 for owners of earlier versions. Xenix Cobol Tools costs $450 and Xenix Cobol costs $950.

## Microcomputer directory out

Data Decisions, Inc. of Cherry Hill, N.J., has published a directory of 145 multiuser micros from 65 vendors.

The directory includes a chart that reportedly offers at-a-glance comparative information on systems, including their CPUs, number of users supported, base configurations and price ranges.

The 42-page directory also describes each product in detail, including the product's type, systems and applications software, pricing, support and availability. It costs $29.

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The P351 printed this headline letter-perfectly

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# COMMUNICATIONS

## PBXs, nets not key in terminal support

### But survey reveals more users considering idea

By John Dix

Few companies today are supporting terminals with local networks or telecommunications switches, according to a *Computerworld* survey, but this is the area where most users seem to be focusing their attention.

The survey, sent with a dollar incentive to a random sampling of 1,000 *Computerworld* subscribers in July, was answered by 425 readers. Nearly half of these readers — most of them MIS/DP managers — represented companies with revenues of $50 million or more, and another 25% took in between $10 and $50 million in 1984.

Companies represented in the survey were concentrated in three major areas: manufacturing firms (22%), finance/insurance/real estate (22%) and education/medicine/law (17%).

The survey results were not specific enough to segment how terminals are supported in each industry sector, but, taken together, they inferred that most users still support terminals with direct point-to-point links. Nearly 60% of the respondents said they do not use local networks or private branch exchanges to support terminals.

Of the 40% of respondents remaining, roughly 16% said they use their PBXs to support terminals, nearly 12% said they use local nets, and 13% said they support some of their terminals with a combination of the methods.

The actual number of terminals being supported by users of local nets and PBXs is a small percentage of the total number of terminals owned by these roughly 180 respondents.

For example, 24% of the respondents using local networks to support terminals said they have less than one-tenth of their displays connected to the network. Another 14% said they support less than one-fifth of their terminals on their networks, 10% support almost half, and 12% reported they have all of their tubes connected

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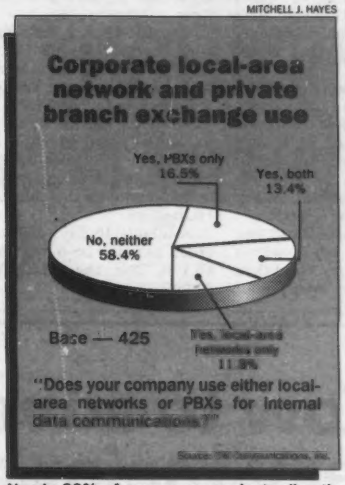
MITCHELL J. HAYES




Nearly 60% of survey respondents directly wire their terminals.

## AT&T unveils modems, net control, muxes

AT&T unleashed a barrage of products at the recent Telecommunications Association's annual meeting in San Diego, including modems, multiplexers and network control units.

The products included two 4.8K bit/sec. modems for dial-up and leased line use; a diagnostic unit for a new switched network modem; a 14.4K bit/sec. six-port modem/multiplexer; and an enhanced multiplexer/packet switch.

Also announced was a system control software package that, when combined with the necessary hardware, costs $40,000 less than the previous model.

The 4.8K bit/sec. modems include the Dataphone II 2248A and the 2048T. The 2248A is a dial-up device, but it can be adopted for analog private lines, after which it will also provide automatic dial backup. The diagnostic modem supports full-duplex (with a half-duplex emulation option), synchronous or asynchronous transmissions. At 4.8K bit/sec., the 2248A is said to be compatible with CCITT recommendation V.32. With a 32-number autodialer option, the modem costs $3,195 or $2,995 without the option. It will be available in April 1986.

The Dataphone II 2048T is a 4.8K bit/sec. full-duplex synchronous modem designed for use with unconditioned four-wire analog leased lines. Designed for use in point-to-point or multidrop applications, the 2048T is said to be line compatible with the 2048A and 2048C modems and capable of responding to tests and commands from Dataphone II control systems. The 2048T will be available in mid-October for $2,600.

For lower speed applications, the 2224E is a 2,400 bit/sec. asynchronous, full-duplex diagnostic dial-up modem. It will be

Continued on page 82

## Dama lowers network rates

Dama Telecommunications Corp. has announced a 38% overall price cut for its lower speed switched data rates.

The rate reductions affect the Damanet Integrated Voice/Data Network service, a software-defined virtual private network. The reductions were made possible by increased network use, lowering the company's own transmission costs.

New charges for the on-demand services, which range from 2,400 bit/sec. to 512K bit/sec., include a 78% reduction for 2,400 bit/sec. circuits, from 16 cents per minute to about 4 cents per minute; a reduction for 9.6K bit/sec. facilities from 20 cents per minute to about 14 cents per minute; and a reduction for 19.2K bit/sec. facilities from 35 cents per minute to 28 cents per minute. Damanet's 6-sec. incremental billing structure has been retained.

The rate reductions also include Damanet's maximum transmission rates. The monthly maximum fee for a 2,400 bit/sec. circuit for transmission between New York and Philadelphia, for example, is $64, $224 less than the previous $288 charge. A 9.6K bit/sec. circuit between Chicago and San Francisco is reduced by $343, from $1,200 to $857.

The restructured rates set a $4,000 per month minimum billing requirement for each of Damanet's proprietary communications processors used in a customer's network. The fee applies to cumulative voice, data and video transmission charges. The cost to activate a voice port on a Damanet communications processor has been reduced from $75 to $25.

Dama Telecommunications is authorized by the Federal Communications Commission to operate as a common carrier for Digital Electronic Message Services.

## IBM replacement multiplexer debuts

Bundled with its recent introduction of protocol converters, IBM unveiled a replacement model for its 3299 terminal multiplexer.

When used with the IBM Cabling System, the 3299 Model 2 extends the maximum permissible distance between 3274 cluster controllers and category A display terminals from 4,000 to 6,000 ft.

The 3299 attaches with a single coaxial cable to a 3274, which is outfitted with a multiplexer adapter. The 3299, in turn, can support up to eight display terminals with coaxial cable connections or with the IBM Cabling System.

When standard coaxial is used, the 3299 Model 2 provides the same functional capabilities as Model 1.

With the IBM Cabling system, the maximum permissible distance between the terminal multiplexer and its controller is now 3,280 ft, with terminals supported at up to 3,280 ft. Baluns are not required on the host side.

The new model will be available later this month for $1,175.

## BMC Software's VM/Optimizer out

A systems software product that enhances IBM's VM operating system to provide compression of 3270 data streams has been added by BMC Software to its family of similar products for IBM's CICS and IMS.

The Sugar Land, Texas, company's 3270 Optimizer/VM, which has hooks into VM, uses an algorithm to remove redundant characters and otherwise compress 3270 data being sent to remote display terminals, a spokeswoman explained.

Using the 3270 Optimizer, a normal 1,920-char. data stream used to fill the screen of a 3270 device is compressed by 30% to 35%.

The product is said to be particularly effective in reducing network load and response time bottlenecks in IBM's Professional Office System (Profs) environments. The 3270 Optimizer/VM is transparent to VM, Profs and other applications, the company reported.

The 3270 Optimizer/VM is available now at an introductory price of $9,750 for a perpetual license on the first CPU. Next year, the price will be $12,500.

- Equinox Systems has announced a low-end data switch, a high-end local multiplexer and a board version of that multiplexer for use with the switch/**76**
- Western Union has established what it says is the first intercontinental connection for a U.S. electronic mail service/**76**
- Satellite Business Systems said it will adopt a new rate structure for its dedicated or switched high-speed digital data transmission services and implement off-peak pricing discounts/**79**
- GTE will offer a hybrid business data transmission service that integrates its Spacenet Ku-Band satellite transmission capabilities with its packet-switched Telenet network/**79**

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Multiplexers/Modems/**79**
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# Equinox muxes, switch out

Expanding on its product family of intrafacility data communications devices, Equinox Systems of Miami recently announced a low-end data switch, a high-end local multiplexer and a board version of that multiplexer for use with the switch.

The Equinox DS-5 data switch, reportedly smaller than an IBM Personal Computer in its smallest configuration, has a minimum of 24 RS-232 ports and a maximum of 120. Said to be fully nonblocking, the DS-5 enables a port user to connect to any other port through menu selection.

A 120-line DS-5 costs $120 per port. The entry-level DS-5, which costs $7,500, has 24 ports. Growth is accomplished with the addition of 24-port cards that cost $1,800 each. Using LM-48 local multiplexers, the DS-5 can support a total of 1,320 lines.

The LM-48 is a local multiplexer that concentrates 48 RS-232 channels, each operating at speeds up to 9.6K bit/sec., over a single cable at distances up to 2,500 feet.

While the LM-48 can be used back-to-back to solve wiring problems, it can also be used with the DS-5 when the data switch is outfitted with the board version of the multiplexer, the 1-Line-X48.

Available 45 days after receipt of order, as is the DS-5, the LM-48 costs $3,100, and the 1-Line-X48 costs $1,000.

# Codex local network gives asynch devices link to host

Codex Corp. of Mansfield, Mass., has unveiled a local-area network designed to provide asynchronous devices with host computer connections.

The Codex Async LAN is a new development, according to Ralph Rio, Codex's senior product manager, and not connected to Codex's first-generation product, a prototype of the Ungermann-Bass, Inc. Net/One product.

The heart of the asynchronous network is the Codex 4020 Entryway, a four-port device that uses a Codex-designed and -developed very large-scale integration chip and a Motorola, Inc. microprocessor. Attached devices can communicate through the 4020's four RS-232 asynchronous ports or with devices supported by other 4020s that are interconnected via a baseband Ethernet net.

Terminals supported by the 4020 contend for host ports, enabling access to any minicomputer connected to the network. The Entryway can transmit data at speeds from 50 bit/sec. up to 38.4K bit/sec.

Codex said the price of the 4020 is $249 per port or $410 for the average configured system. One Entryway would cost approximately $1,000.

Also announced was the Codex 4820 LAN Manager, a network management package that is composed of an IBM Personal Computer XT hardware system and multitasking operating software system. This software provides performance monitoring, including fault management, and administration functions that simplify changes to the network.

Pricing of the 4820 was set at $11,605, Codex said.


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# Western Union E-mail service ties U.S., UK

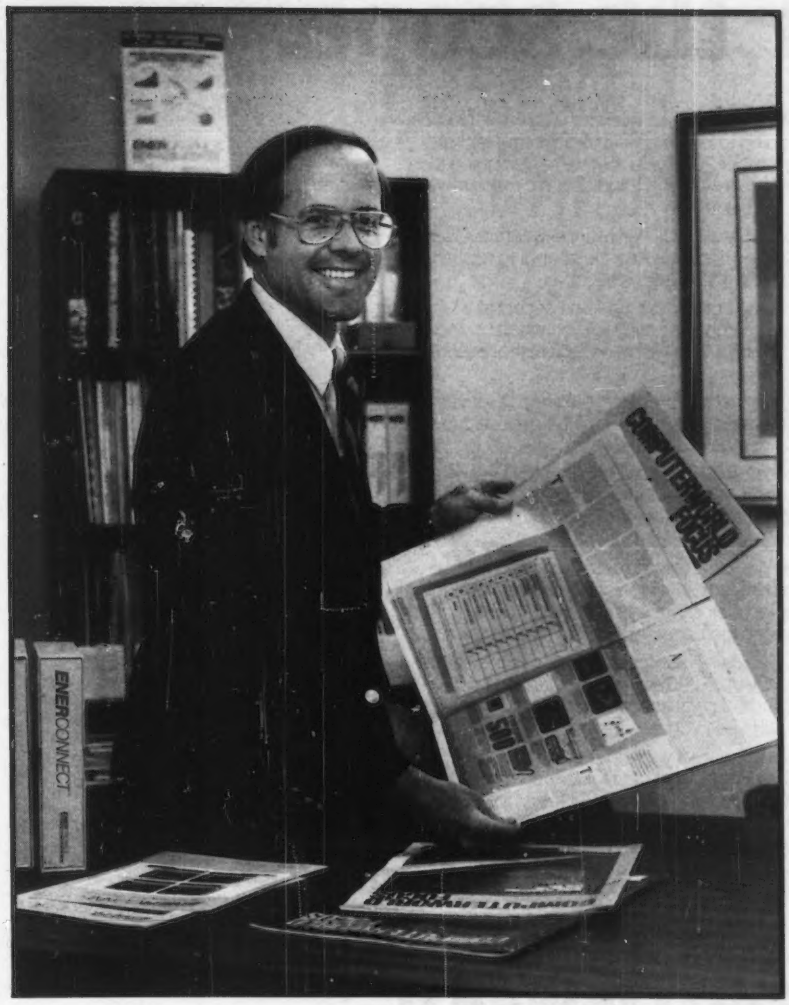
Western Union Co. has announced what is reportedly the first intercontinental connection for a U.S. electronic mail service. Users of Western Union's Easylink will be able to send messages to subscribers of the UK's version of Easylink, which is offered by Cable & Wireless Easylink, Ltd.

The service does not require any special codes or messages, only the address of an Easylink subscriber. The cost of sending a message to a UK subscriber is 25 cents per 1,000 characters plus a fee of 40 cents per message and a long-distance dialing charge. There are no off-peak discounts.

Sending a message from the UK to the U.S. costs approximately 40 cents plus 9 cents per 1,000 characters. Off-peak hour rates are 31 cents and 7 cents respectively.

The cost of transmitting a Telex is 25 cents per 100 characters during peak hours and 21 cents during off-peak hours. Sending a Mailgram costs $6.75 for the first page and approximately $2.70 for each succeeding page.

# "Two ads in Computerworld Focus flooded us with inquiries on our new micro product, EnerConnect."




EnerConnect is the second major micro product from Enertronics, developers of the successful EnerGraphics package. As the ad for EnerConnect says, it is ". . . the first software package that puts mainframe graphics capability into the hands of anyone with an IBM PC . . . or 3270 PC."

When it came time to announce EnerConnect, Randy Andes decided to use *Information Week, Business Week,* and *Computerworld Focus.* As Randy puts it, ". . . we knew *Computerworld* reached the people we need to talk to from past ads for EnerGraphics, and we decided to test *Focus* because, as the name says, each issue focuses on a topic. So, we could select an appropriate editorial environment."

The results? "*Computerworld Focus* has produced the most response of any of the publications used and, by far, the best response. In fact, total response (via the 800 number) has far exceeded expectations. We further intend to continue to tie into *Computerworld's* editorial calendar where appropriate."

The moral? Well focused advertising in a well focused medium will produce the best results every time.

Call your *Computerworld* advertising representative for more details on upcoming issues of *Computerworld Focus.*

*Randy T. Andes, Director of Marketing, Enertronics Research, Inc., St. Louis, Missouri.*

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# Micros: The big picture.

## In November's *Computerworld Focus*, we put micros under the scope.

Since the last year has been so wild and unpredictable, we're not only going to take a look at microcomputer hardware in our November 20th issue, but we're also going to broaden our view to try to get a handle on the micro market in general.

We'll have a special section on hardware—what's available and what's expected to come. And the changing relationship of micros and the 3270 terminal.

We'll also dissect the entire industry—one aspect at a time. Among user companies, we'll tell you who's buying and who's *not* buying—and why. And look at the reasons in great depth.

Then we'll dig deep into the industry shakeout. Discover who's got the edge and who doesn't. Who's expected to survive. And how that will mold the future.

We'll see how the slowdown is affecting the way user organizations are planning. Whether they're simply making do with what they've got until the shakeout is over. Or if they've actually satisfied their needs.

But that's not all. We'll also take a look at how communications and networking are coming along. And the developing trends in printer technology including the laser printers. And what's happening in the portables and lap size micros.

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So if micros are a big part of your business picture, our **November 20th** issue of *Computerworld Focus* should be a big part of your advertising picture. But hurry, the closing is **October 11th**.

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# GTE Skystar service to join net, satellite

GTE Corp. said last week that it will offer a hybrid business data transmission service that integrates its Spacenet Ku-Band satellite transmission capabilities with its packet-switched Telenet network

The network service will be called Skystar and will be compatible with most data communications protocols, including IBM's Systems Network Architecture/Synchronous Data Link Control and Binary Synchronous Control protocols, the company reported. GTE said Skystar will also perform protocol conversion from remote sites.

James T. Broadhead, president of the GTE Communications Services group, said the linking of the two existing systems will help address the diverse data communications requirements that are found. "Spacenet's Skystar network, for example, serves very high-speed transmission requirements in a centralized environment — many remote locations to one central host."

In a related matter, GTE was dealt a blow recently when a French rocket carrying a Spacenet satellite aloft went off course and had to be destroyed.

## MULTIPLEXERS/ MODEMS

**■ Racal-Vadic, Inc. has introduced a 2,400 bit/sec. modem that is compatible with IBM's Binary Synchronous Communications protocol.**

The 2400PA-S is a full-duplex, synchronous modem with automatic dialing capabilities. It can be used for unattended communication with IBM 2780/3780 remote job entry applications.

The modem automatically selects pulse or tone dialing and matches the speed of host computers at speeds of 1,200 or 2,400 bit/sec. Call progress information is displayed so that a user can monitor a connection. A tandem dialing feature permits dialing through private branch exchange to long-distance carriers.

The modem's diagnostic capabilities include automatic self-testing, analog loop-back, local digital loop-back, remote digital loop-back and a built-in test pattern generator.

Configuration options include Electronic Industries Association (EIA) signal timings that customize EIA interfaces for use with multiplexers and port contenders.

The 2400PA-S sells for $795.

*Racal-Vadic, 1525 McCarthy Blvd., Milpitas, Calif. 95035.*

**■ Lantel Corp., a manufacturer of broadband voice and data modem products, has added two items to its product line.**

Lantel 500A Broadband Asynchronous Data Modem is a narrow-band, asynchronous modem that operates at speeds of up to 9.6K bit/sec. The product is designed for point-to-point

Continued on page 82

# SBS reduces rates for data transmission

Satellite Business Systems (SBS) in Mclean, Va., said it will adopt a new rate structure for its dedicated or switched high-speed digital data transmission services and implement off-peak pricing discounts.

The rate restructuring applies to switched and dedicated 56K bit/sec. and 1.54M bit/sec. data transmission services and will reduce port charges for both speeds by half.

For usage-sensitive switched 56K bit/sec. service, the monthly port charge has been lowered from $770 to $300. The maximum monthly charge is $1,500 per port.

For 1.54M bit/sec. switched service, the monthly port charge has been reduced from $3,000 to $1,500. Monthly usage charges are capped at $15,000 per port.

SBS said it has introduced a non-business-hour usage charge of $60 per hour for transmission during evenings, weekends and holidays, compared with the regular business hour rate of $300.

The company also said that it has reduced its mileage band rates for circuit-switched 56K bit/sec. service to $1,450 per month for the first 500 miles and to $1,000 per month plus 90 cents per mile for greater distances.

For dedicated circuits, SBS said the charge for a 1.54M bit/sec. circuit is $25,000 per month during the business day, which will save an estimated $4,000 to $27,000, depending on circuit length.

In another matter, SBS said it will be the first common carrier to encrypt satellite data and voice transmissions, using the Data Encryption Standard developed by the National Bureau of Standards. The service will be available for SBS' Skyline Wats customers in January. The service will carry a one-time port charge of $85 plus a usage charge of 1.2 cents per call minute.

SBS is a joint venture of IBM and Aetna Life & Casualty Co. IBM and MCI Communications Corp. have reached an agreement in principle to merge the SBS system into MCI's network.

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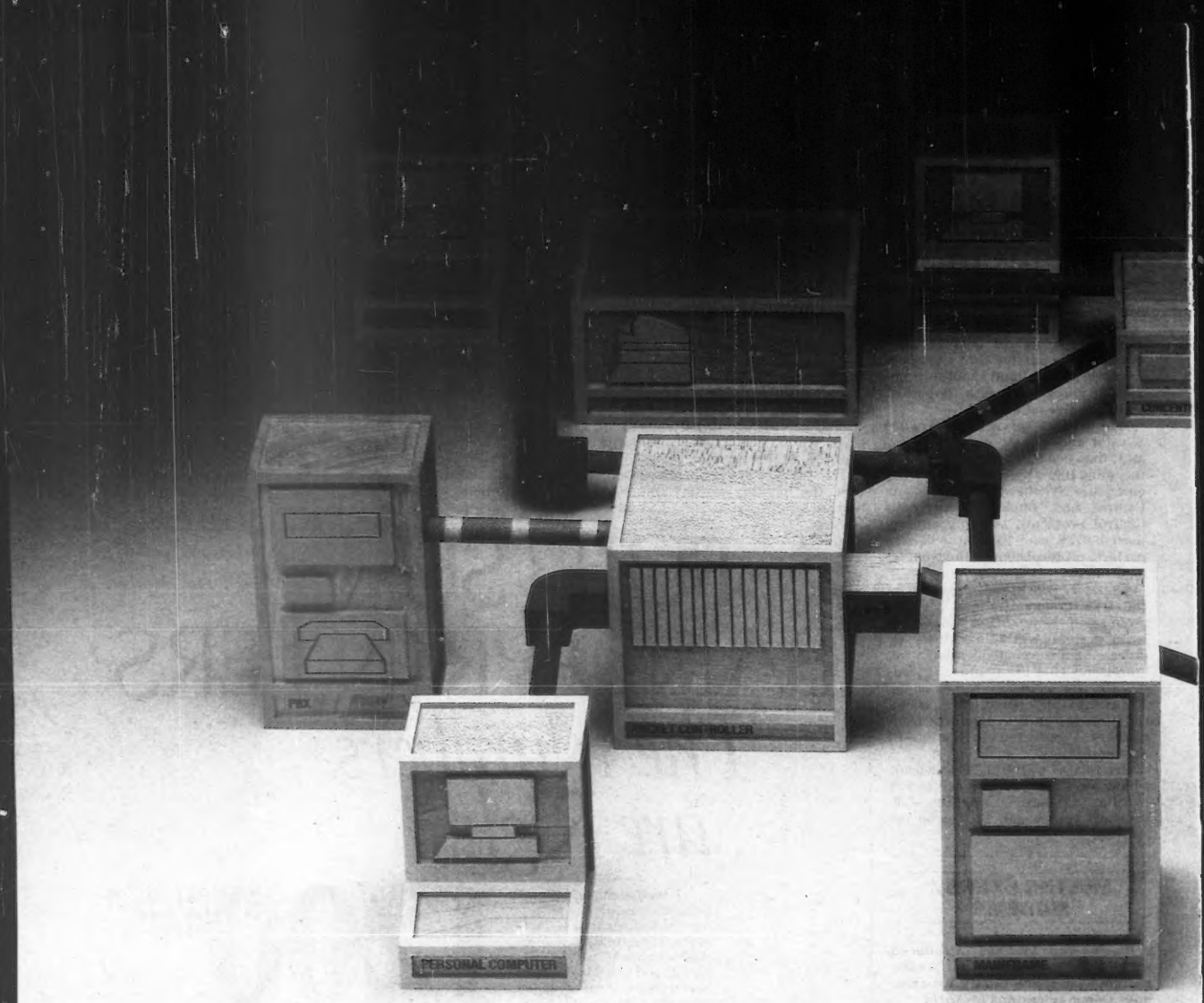


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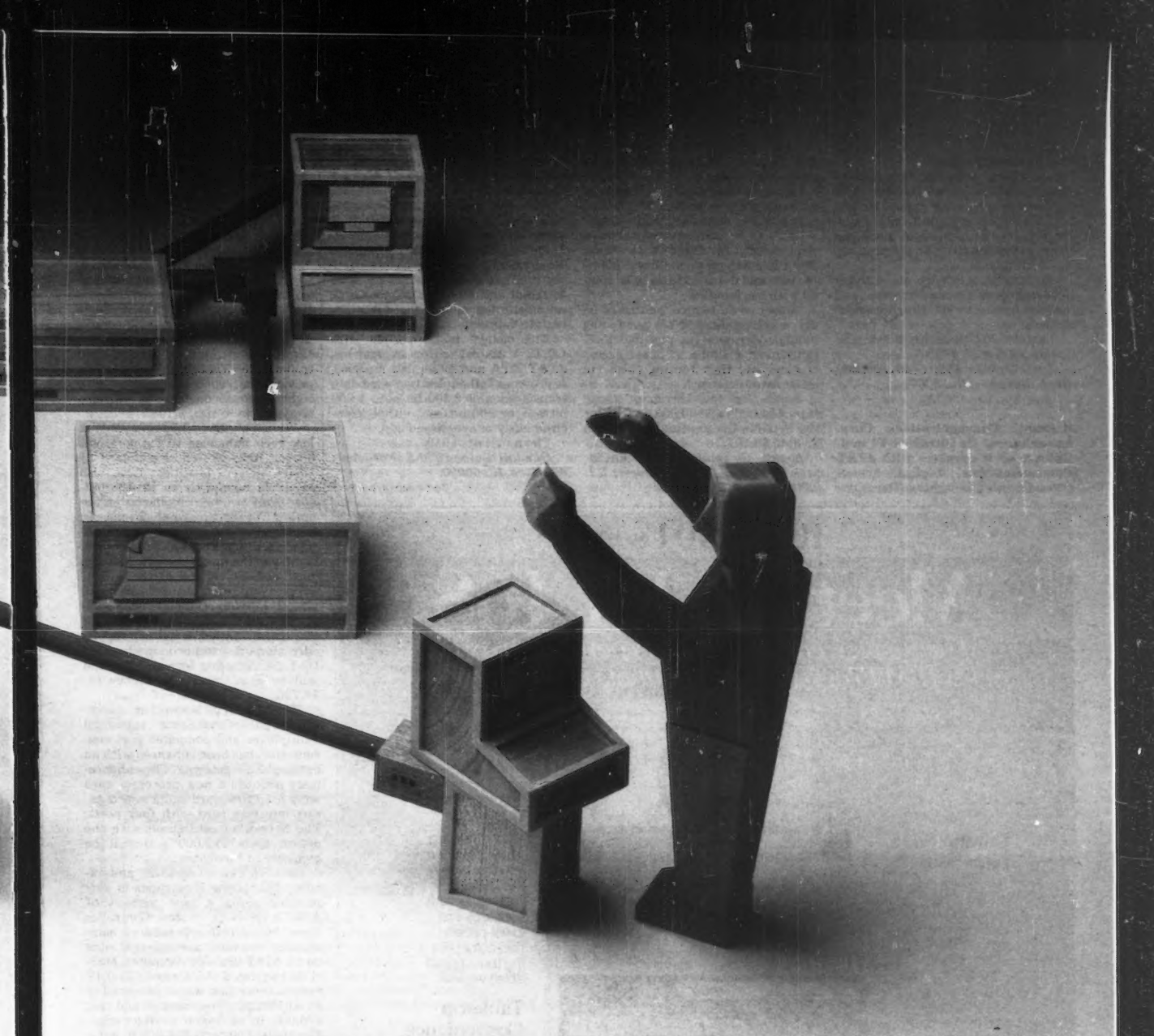

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AT&T
The right choice.

Continued from page 79

or multidrop applications on a two-way broadband network. It reportedly features a bit error-rate of $10^{-9}$.

Lantel 500S operates in either synchronous or asynchronous mode and supports transmission speeds of up to 19.2K bit/sec.

Both modems can operate in either half-duplex or full duplex mode and can use frequency shift keying modulation.

Lantel 500A sells for $695, and Lantel 500S costs $895.

*Lantel, Suite 180, 6410 Atlantic Blvd., Norcross, Ga. 30071.*

■ **Avanti Communications Corp. has enhanced its Ultramux T1 multiplexer so it operates with AT&T Communications' Digital Access Cross-Connect Switching (Dacs) under Customer Controlled Reconfiguration (CCR).**

Avanti's Flexible Dacs Access enables a user to segment a T1 line into groups of channels and, under AT&T's CCR tariff, switch them independently to different locations. The Ultramux product allows sublevel voice and data channels to be routed with the bundles.

A user could reduce the cost of local access channels by combining bundles destined for multiple locations over a single T1 local access channel and then routing them via Dacs, Avanti claimed.

Prices for the Ultramux range from $14,000 to $100,000. Prices for the Flexible Dacs option range from $800 to $3,500.

*Avanti Communications, Aquidneck Industrial Park, Newport, R.I. 02840.*

■ **Gandalf Data, Inc. has introduced a 2,400 bit/sec. intelligent dial modem.**

The first model in the Access Series 24S is a large-scale, integration-based modem with features that include Hayes Microcomputer Products, Inc. command compatibility; multiple-number recall; automatic redial and alternate number dial; automatic logon; and three-wire interface support.

The modem is compatible with CCITT V.22 bisynchronous modems, AT&T 212A and AT&T 103 modems. It provides full duplex two-wire data transmission at 2,400 bit/sec., 1,200 bit/sec. or 300 bit/sec., either asynchronously or synchronously.

The unit costs $650.

*Gandalf Data, 1020 S. Noel Ave., Wheeling, Ill. 60090.*

Continued on page 83

IBM 3270 Users:

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**Unique Capabilities**

A fully integrated, plug-compatible replacement for the IBM 3268-2C and 3287-2C, the ISI 468 is the only non-IBM color printer to support Programmed Symbols and APL/TEXT. What's more, it's the only 3270 printer, from IBM or elsewhere, that prints seven colors. Its other advantages include:

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The ISI 468 prints at 400 CPS, compared to 340 CPS for the IBM 3268-2C and 120 CPS for the 3287-2C.

If color printing is not a concern, you can obtain the ISI 468's high-speed advantages in a lower-priced, non-color-printing (but upgradable!) version.

**Tabletop Convenience**

The ISI 468 offers easy portability while taking up less space than the floor-standing 3268-2C. Plus, with its top-loading design, there's no need to crouch under a bulky cabinet to load forms.

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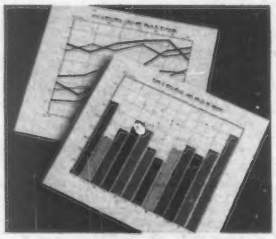

For more information, please call **1-800-544-4072** (in Michigan, 313/769-5900). Or write to Interface Systems, Inc., 5855 Interface Drive, Ann Arbor, Michigan 48103, Telex: 810-223-6058.

Interface Systems, Inc.

*The Right Printers for the Right Computer Systems*

From page 75

## AT&T unveils modems, net control, muxes

available in March next year for $1,265 or $1,395 with an autodial option. For diagnostic control, the 2224E has to be used in conjunction with the new SDU 24A shared diagnostic unit. This device works as a translator between a 2224E modem and Dataphone II diagnostic control devices like the Diagnostic Console, Network Controller or System Controller. The $975 SDU 24A emulates a private-line control modem with eight tributary modems. It will also be available in March 1986.

While not new, AT&T's 735 T-Mux has been enhanced to support 56K bit/sec. links as well as standard T1 1.54M bit/sec. facilities. It is also available now with an RS-422/Mil-spec 1888-114 data channel interface option for secure applications. In minimum configuration, the enhancement costs $1,350.

New to the line is the 724 T-Mux, a small-chassis version of the 735. It supports up to 16 channels and uses adaptive differential pulse code modulation voice digitization at 64K or 32K bit/sec. Either device can reportedly support extended or standard DS-1, T1 signaling formats. The 724 will be available in November for $6,725.

The AT&T 719 Networker, a combined packet-switching statistical multiplexer and computer port concentrator, has been enhanced with an optional X.25 gateway. The enhancement includes a new processor card with X.25 firmware and a new data-link interface card with four ports. The Networker configured with the option costs $12,000 and will be available in November.

Network control of these and existing Dataphone II products is now possible using a new version of AT&T's Level IV System Controller Model 300, a real-time network management software package that runs on an AT&T 3B2-300 computer. Model 300 replaces the former Level IV System controller, which consisted of an Application Processor 16 and cost $96,000 in minimum configuration. The Model 300 costs $56,000 in minimum configuration, while providing the same capabilities as the Level IV controller.

From page 75

## PBXs, nets not seen key for terminal support

on networks. These users represent the majority (60%) of the respondents; the rest varied widely as to how many of their terminals were attached to local nets.

The same holds true for users who said they use their PBXs to support terminals — most use PBX links to support a relatively small percentage of their installed terminals. Of these respondents, 20% use their PBXs to support less than one-tenth of their terminals; 9% support roughly one-fifth of their tubes; 10% support nearly one-third; 8% support almost half; and 6% support all their terminals in this manner.

Interestingly, while nearly 60% of the users surveyed do not use local nets or PBXs to support terminals, these were the two items mentioned most frequently in terms of significant communications plans scheduled for next year.

From page 82

## Multiplexers/Modems

■ **Codex Corp. has announced the Codex 2608 Eight Modem Nest that supports up to eight Codex 2600 series modems with a bus architecture. Up to five of these nests can be stacked in a 72-in. rack.**

The product can be fully configured with any combination of Codex 2600 series modems, including the 2660, 2640 and 2620, plus four- or six-channel multiplexers. The modems can be configured both before and after installation.

The price of the Eight Modem Nest varies by configuration, ranging from $4,000 to $12,000 per modem.

*Codex, 20 Cabot Blvd., Mansfield, Mass. 02048.*

■ **Networx has released a modem protector that provides surge protection for modem devices.**

The Modem Protector is said to prevent voltage damage to telecommunications equipment. The device works in two stages. The first stage consists of a gas discharge arrestor that can handle a maximum pulse of 5,000A and handles the bulk of the surge. The second stage consists of silicon surge suppressors that are said to clamp the sharp leading spike within 1 nsec.

The unit costs $21.95.

*Networx, 203 Harrison Place, Brooklyn, N. Y. 11237.*

■ **Spectrum Digital Corp. has introduced its Spectramux Net 1.5 bit-interleaved multiplexer that is said to concentrate more than 500 voice, data and video channels on eight T1 aggregates.**

The Net 1.5 features Adaptive Differential Pulse Code Modulation (ADPCM) voice, automatic alternate routing with priority bumping, D-4 channel bank compatibility and programmable channel speed selection. Each ADPCM card supports 72 voice channels at 24K bit/sec. with fallback to 32K bit/sec., which provides 48 voice channels, the vendor said.

The unit supports AT&T standards, including Dataphone Digital Service, Accunet, M-44, M-24, D-4 and Digital Multiplexed Interface.

The cost of the Spectramux Net 1.5 multiplexer starts at $25,000, depending on the number of channels in the system.

*Spectrum Digital, 7680 Old Springhouse Road, McLean, Va. 22102.*

■ **Digital Communications Associates, Inc. (DCA) is offering a fast poll, CCITT V.29-compatible modem for use in four-wire, leased-line, point-to-point or multipoint applications at speeds up to 9.6K bit/sec.**

Called the DCA 932, the full duplex modem can be used with unconditioned lines, permitting serial data transmission at 9.6K, 7.2K, 4.8K and 2,400 bit/sec., the vendor stated.

An automatic adaptive equalizer reportedly uses phase tracking circuitry to respond to changing transmission line conditions on a continuous basis.

An integral test pattern generator and bit error-rate detector are said to perform network bit error-rate testing without external equipment or remote operators.

The DCA 932 costs $2,695.

*DCA, 1000 Alderman Drive, Alpharetta, Ga. 30201.*

## LOCAL-AREA NETWORKS

■ **Hanzon Data, Inc. has announced a device that enables data to be transmitted over standard ac power lines within a building at rates that range from 300 bit/sec. to 19.2K bit/sec.**

Data terminal equipment plugs into the Power Line Coupler, which plugs into a wall socket and acts like a modem. The coupler and accompanying software enable up to 32 devices to be interconnected over a building's power wire at distances up to 1,000 ft.

The coupler costs $395.

*Hanzon Data, 18732 142nd Ave. N.E., Woodinville, Wash. 98072.*

■ **General Electric Co. plans to ship early next year Genet Factory LAN, a broadband token bus local-area network compatible with General Motors Corp.'s Manufacturing Automation Protocol that operates at speeds of up to 10M bit/sec.**

The network will consist of a bus-interface unit, head-end remodulator, Workmaster network management console and software. Industrial Networking, Inc., a joint venture between GE and Ungermann-Bass, Inc., is supplying the network, GE said.

*GE, One River Road, Schenectady, N.Y. 12345.*

## NETWORK SERVICES

■ **Satellite Business Systems (SBS) recently announced it has restructured its pricing and extended its Skyline Wats service.**

Skyline Wats customers can call Hawaii from all SBS Network metropolitan areas, and a Wats connection to Alaska is now available from 14 metropolitan areas.

The price restructuring applies the Skyline Wats Tier I rate to calls terminating in a Tier I city Local Access and Transport Area and not just the immediate metropolitan area. The change is expected to save customers up to 4%, the vendor said.

*SBS, 8283 Greensboro Drive, McLean, Va., 22102.*

■ **AT&T Communications has purchased a 60-mile, fiber-optic digital transmission system from Philips/CSD, Inc., located in Piscataway, N.J. The system links AT&T facilities in New York.**

The system works with a multilevel bit-rate reduction scheme and maintains a bit error-rate of 10-13, Philips/CSD reported. The DS-3-compatible system supplies a capacity of up to 8,064 telephone trunks, is modularly upgradable and can supply 1G bit/sec. transmission rates.

*AT&T Communications, 295 N. Maple Ave., Basking Ridge, N.J. 07920.*

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Your ad in CW Communications' Swedish publications will introduce your company to 63,000 computer professionals in Sweden's flourishing market. According to International Data Corporation (IDC), the world's leading information industry research firm, Sweden's total data processing expenditures are expected to soar from $2.3 billion in 1983 to $6.3 billion by 1989.

*Computer Sweden*, the only Swedish MIS/DP publication, reaches 15,000 readers each week. Every Monday DP professionals turn to *Computer Sweden* for updates on the latest developments in hardware, software, terminals and supply products.

*Svenska PC World* is the magazine 12,000 IBM PC users rely on twice each month for timely information on program reviews, user reports, new products, tests and recommendations. IBM has the largest market penetration in Sweden with revenues for 1983 of nearly half a million dollars.

*MikroDatorn* is written specifically for the Swedish microcomputer market which, according to IDC, is growing at an annual rate of 44%. *MikroDatorn* is the monthly magazine that reaches 36,000 business/professional and home/hobby micro users with up-to-date industry information.

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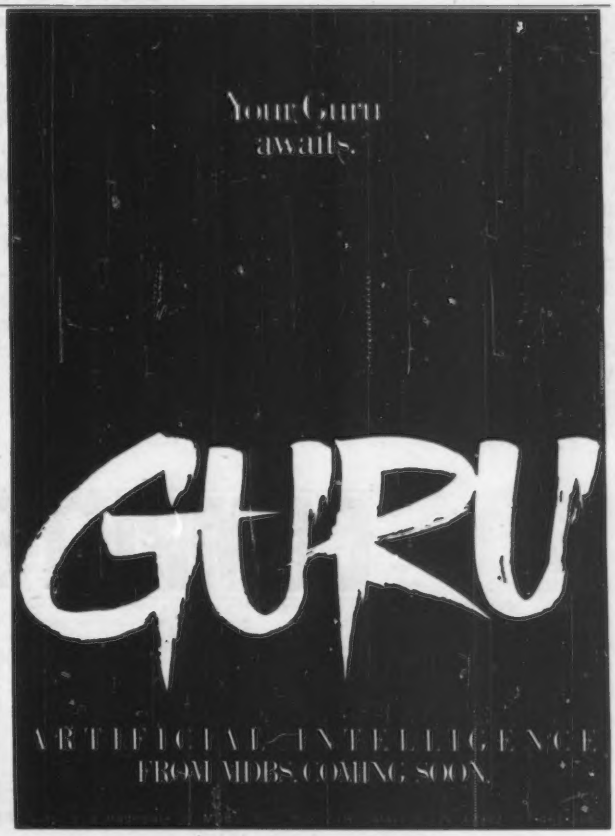

# Our issue on Big Blue can put you in the black.

Big Blue or not Big Blue.

A decision everyone must ultimately make. And even when they choose an alternative, invariably the first question is how to connect with IBM equipment.

Our December 4th *Computerworld Extra!* will provide a number of perspectives on the situation. Which will be of critical interest to anyone dealing with IBM. And that's just about everyone.

First, we'll delve deep inside the company itself. And look at possible mergers and acquisitions, corporate structure, financial status, and the personalities involved.

Then we'll take a hard look at the company's products and strategies. We'll discuss their strengths and weaknesses. We'll look at the new hardware introductions. And explore IBM's local area networking introductions.

Finally, we'll cover the alternatives, from PCs to mainframes. And of course, the compatability issue.

And all this information will go out to our 128,000 paid subscribers. Plus the hundreds of thousands of people they pass us along to.

So if you've got a product or service that's IBM compatible — or an alternative — let IBM do your selling for you. In the December 4th *Computerworld Extra!* on IBM. But hurry, closing is October 25th.

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# SYSTEMS & PERIPHERALS

## Transaction systems: no comparison

### Lack of standards seen confusing to customers

By James Connolly

Banks have boosted automated teller services, and Fortune 500 industrials have moved into computer-automated factories, creating a booming market for established computer companies such as IBM and nondescript start-ups.

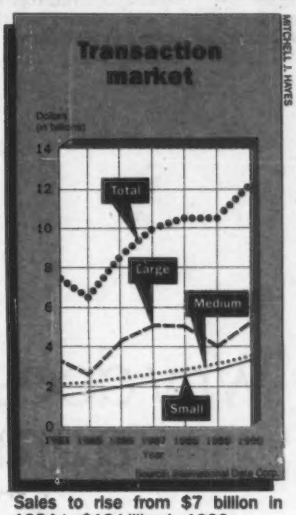
Market researchers predict that new applications in banks, factories, government agencies and other user organizations will drive the transaction processing market from $7 billion in 1984 sales to more than $12 billion in sales and 119,000 unit shipments in 1990.

For all of that growth, however, there remains a danger — the inability of customers to compare various vendors' products. Key transaction processing vendors agree that, like other specialized processing areas such as supercomputing, transaction processing performance cannot be measured the way batch processing is measured — the fallible but commonly used million instructions per second (Mips) rating.

Twenty years after major corporations started using large computers to process transactions immediately, interviews with vendors and users show they still are unable to agree on benchmarks. It is difficult to judge transaction processors and the systems that grow up about them, systems that may include dozens of superminicomputers in a string and remote terminals spread over thousands of square miles. Even where there is a desire for benchmarks, there is no consensus on how to build them.

"Having a standard obviously would make it easier to measure the relative performance of transaction systems. From the vendors' perspective, I'm not sure it's in [their] best interest to have a standard measurement. As it is, using Mips works to their advantage and confuses the customer. From a customer perspective, it would be good, but I'm not sure one benchmark ever will become a standard," observed Bob Good, senior systems designer for Bankamerica Corp. in San Francisco.

Good was one of 24 users and vendor representatives who coauthored a technical report on transaction processing for the Institute of Electrical and Electronics Engineers, Inc. (IEEE) last year. The paper suggested three possible benchmarks: Debit Credit, a banking transaction that interacts with a block-mode terminal via X.25, debiting a bank account and doing a double-entry bookkeeping transaction; Scan, a minibatch Cobol transaction that updates 1,000 records; and Sort, a disk sort of one million records.



Sales to rise from $7 billion in 1984 to $12 billion in 1990.

However, those 24 authors noted that their paper failed to capture the performance bugs in their systems, such as recovery from a crash or start-up of new software. Almost a year after the group began work there is no formal activity in connection with benchmarking, Good noted.

One of the originators of the IEEE paper and a transaction processing analyst is Omri Serlin, princi-

Continued on page 89

## Transaction system sales to mushroom

The need for mainframe-based systems and on-line applications will fuel an almost 80% growth in shipments of transaction processing computers by the end of 1990 (see chart above), according to a recent report by International Data Corp. (IDC), a Framingham, Mass.-based market research firm.

In its first research study of the transaction processing market, IDC listed more than 50 typical transaction-oriented applications in fields as diverse as finance, medicine, education, government, transportation and industry.

Looking at the next five years, the report, "The Transaction Processing Market," cited the following:

- A general movement to more transaction-oriented applications as a result of the changing nature of MIS groups. "The need to do more retrieval and updating of data bases will be important," it said.
- The existence of applications that are entirely transaction oriented. "Good examples include [automatic teller machine] networks in banks, retail points-of-sale and new inventory measures to support just-in-time manufacturing."

The move to transaction processing

Continued on page 89

■ Computer Consoles unwrapped a low-end member of its Power series of AT&T Unix-based minicomputers/86

■ Three series of configurations were announced for Flexible Computer's Flex/32 parallel processing systems/86

■ Perkin-Elmer modified its 3200 series of superminicomputers to optimize its version of Unix/87

## General Dynamics offers departmental systems line

By Mitch Betts

WASHINGTON, D.C. — General Dynamics Corp.'s Electronics Division, based in San Diego, recently announced it will market a line of departmental systems loaded with data base management software for use by U.S. government agencies and their contractors.

The announcement at the recent Federal Computer Conference marks the first time the major defense contractor, which had $7.8 billion in revenue last year, has offered what it calls a departmental mainframe, according to Ravi Bhola, program manager of advanced systems. He said the move is part of a strategy to meet the needs of military and intelligence computer users and does not mean General Dynamics plans to enter the broad commercial computer market.

The Model 5000 departmental mainframe, with a distributed architecture based on a 32-bit CPU, is IBM compatible and was licensed from Canaan Computer Corp. of Trumbull, Conn., Bhola said.

At the Federal Computer Conference, General Dynamics and Cambridge, Mass.-based Computer Corp. of America (CCA) announced a joint marketing agreement. Under the terms of the agreement, General Dynamics will distribute and support the Model 5000 running CCA's Model 204 data base management system.

Continued on page 88

## Mentor Graphics launches parallel processing engine

By Donna Raimondi

BEAVERTON, Ore. — A company that has focused on computer-aided engineering software tools has jumped into the computer hardware business with a plug-in, parallel processing accelerator engine for engineering workstations.

Mentor Graphics Corp. has unwrapped its Compute Engine — a general-purpose accelerator that is said to employ parallel processing techniques with reduced instruction set computer (Risc) processors — as a plug-in addition to Apollo Computer, Inc.'s DN550 and DN560 workstations. The unit will be available in the first quarter of 1986.

The two-board Compute Engine is said to increase throughput on all modes of simulation, placement, routing, design rule checking and data formatting. Performance reaches up to 200,000 gate evaluations per second using the company's Quickparts parts models to speeds approaching 100 gate evaluations per second for conventional parts, the vendor said.

The Compute Engine runs a standard version of Spice, the University of California at Berkeley's computer-aided engineering software package, at five times the performance of Spice running on the Apollo workstation without the engine, according to Mentor Graphics.

Continued on page 88

# Computer Consoles introduces 16-bit, 16-user mini

Introducing an entry-level system targeted at small businesses and networked applications, Computer Consoles, Inc. of Rochester, N.Y., has announced a 16-user, 16-bit minicomputer that uses the same memory management techniques as its Power 6/32 superminicomputers.

The Power 5/32 is based on a Motorola, Inc. MC68010 microprocessor and the AT&T Unix operating system. It is intended for use in office automation, in standalone configurations for eight to 16 users and in networked environments running Computer Consoles' Officepower office system.

Computer Consoles Chairman and Chief Executive Officer John F. Cunningham reported that the U.S. Air Force Office of Public Affairs has contracted to purchase the first Power 5/32 systems under a $4.4 million contract.

According to Computer Consoles, the Power 5/32 was designed as the entry-level unit and the most compact of the Power/32 series, weighing less than 50 lb and measuring 6½ by 18 by 22 in.

The company claimed that the hardware-intensive memory management scheme originally created for the Power 6/32 provides the Power 5/32 with the flexibility of a larger virtual memory machine and allows the CPU to operate at 12½ MHz with zero-wait states.

Computer Consoles also announced its Powerterminal II, designed for use with the Power 5/32 and other members of the Power family and with Computer Consoles' PTNet local-area net. The terminal is said to feature a 307K bit/sec. communications capability and local intelligence based on a Motorola MC68008 microprocessor.

The company said that the Power 5/32 features a storage subsystem including a Motorola MC68000 microprocessor and 128K bytes of local dynamic random-access memory. It supports one or two 5¼-in., 85M-byte disks and a 45M- to 60M-byte streaming tape drive.

A typical Power 5/32 configuration — with 2M bytes of memory, 170M bytes of disk storage, a 45M-byte tape system, the Unix operating system, Officepower software and eight Powerterminal II workstations — costs $38,350 and will be generally available during the fourth quarter of 1985. A comparable 16-user configuration costs $59,200. The single-unit Powerterminal II with the local-area network connector costs $1,795.

# Flex/32 series out

Flexible Computer Corp. of Dallas has announced three series of configurations for its Flex/32 multicomputer parallel processing systems for end users and OEMs.

The Series 2000, Series 3000 and Series 6000 use a parallel multiple-bus architecture and concurrent software. Each series was designed to be upwardly compatible with the next.

The Series 2000 includes from four to 10 32-bit Flex/32 superminicomputers capable of parallel operations. Memories range from 4M to 40M bytes of random-access memory, and the I/O bandwidth ranges from 40M byte/sec. to 100M byte/sec. A four-processor Series 2000 starts at $150,000.

The Series 3000 features six to 20 Flex/32 processors, 6M to 85M bytes of memory and an I/O bandwidth ranging from 60M byte/sec. to 200M byte/sec. A six-computer configuration starts at $230,000.

The Series 6000 includes 30 or 40 Flex/32 processors, 46M to 169M bytes of memory and an I/O speed from 300M to 400M byte/sec. A 30-processor configuration starts at $1 million.

Flexible said the Flex/32 is a parallel multicomputer environment with up to 20 directly programmable superminis per cabinet.

"Why doesn't somebody make a graphics terminal you can change to fit different jobs?"

*U.S. list prices.
DEC is a registered trademark of Digital Equipment Corporation. PLOT 10 is a registered trademark of Tektronix, Inc.

PG 02518

# Perkin-Elmer revamps 3200 series to optimize Xelos

## Adds processor for network link

By Charles Babcock

NEW YORK — Perkin-Elmer Corp. of Oceanport, N.J., has reconfigured its 3200 series processor to optimize its AT&T Unix-based Xelos operating system for a 10% improvement in performance.

In addition, PE announced a front-end communications processor capable of connecting the 3200 series of superminicomputers and high-end Xelos systems to IBM Systems Network Architecture (SNA) and other network environments.

Xelos is PE's operating system based on AT&T's Unix System V, Release 2 with enhancements from the University of California at Berkeley Software Division's Version 4.2, company officials said. Xelos has been available on the 3200 series along with OS/32, Perkin-Elmer's proprietary operating system.

The three basic systems and two enhanced versions in the Xelos processor line were developed by reworking three of the five CPU boards in the 3200 and reconfiguring the microcode to optimize Xelos, said Dennis Tinley, product manager for the Xelos line.

Like the 3200 series, the XF or Xelos series is based on Motorola, Inc.'s 68000 microprocessor, according to officials.

The Xelos line includes the XF/200 supermicrocomputer at the low end with 1M to 3M bytes of memory, 320K bytes of floppy disk storage, 51M bytes of hard-disk capacity, four ports and a graphics controller. A minimum configuration costs $10,150.

The XF/210 is an enhanced version of the XF/200 with six ports, up to 4M bytes of memory and up to 75M bytes of hard-disk storage. It sells for $10,500.

The mid-range processor is the XF/400, a supermini with eight to 16 ports, 2M to 4M bytes of memory and 51M to 170M bytes of hard-disk storage. Its list price is $21,995.

The XF/600 offers 16 to 64 ports, with up to 16M bytes of main memory and 1K byte of direct-mapped cache memory. System options include a 51M- to 2.4G-byte hard-disk system and battery backup for automatic memory retention. Tinley claimed that benchmark tests on the XF/600 indicate its performance is equal to Digital Equipment Corp.'s VAX-11/780. A minimum configuration costs $27,000.

An enhanced version, the XF/610, features an intelligent I/O handler. With a standard configuration of 32 ports and 4M bytes of memory, it will sell for $45,000.

The processors will be available in October, PE said.

Perkin-Elmer officials said they would introduce in January a multiprocessor version of the XF/600 — the XF/800 — with greater performance characteristics. It also said it plans to fill out the low end of the line with an XF/300 in November.

PE has been offering Unix-based systems since 1979. It has an installed base of 300 Unix systems, spokesmen said. The firm will continue to offer the 3200 series, which comes with the PE OS/32 operating system and supports Xelos.

The communications processor, the 3200-CP, is capable of serving as an interface to IBM's SNA, bisynchronous, X.25 and Ethernet. The $13,000 communications processor comes with software options ranging in price from $1,000 to $5,000.

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HEWLETT PACKARD

". . . expansion board!"

From page 85

## Mentor Graphics processor out

The engine executes compiled high-level C language source code so it can deal with simulations above the gate level. The process is said to be transparent to the Apollo workstation user. The compiler is said to accept standard, nonparallel source code and convert it to object code that capitalizes on the parallel architecture. It also produces symbol file information used in symbolic debugging.

### Different from other products

The product is different from other acceleration engines on the market, said Vicky Brown, computer-aided design and manufacturing analyst at International Data Corp., in that it speeds the entire range of engineering tasks.

Other hardware accelerators are designed to speed the simulation process only, she added.

Brown took issue with Mentor's claim to have a Risc system, saying that the instruction set is still large and not a true Risc system. But Mentor's use of parallel processing techniques at a primitive level, analyzing code as it comes in and breaking it into primitive operations such as basic arithmetic operations, is a first in the computer-aided engineering field, she said.

The system is targeted at single users, the vendor said.

Program development tools include a linker which supports overlaying of code/data segments and dynamic binding.

### Other tools available

Also available is an Object Librarian for organizing and maintaining libraries of related object modules and an Image Librarian for defining dynamic binding execution environments.

The $27,900 Compute Engine consists of a CPU board and a 4M-byte memory board. A 10M-byte version costs $31,900. Both packages include one software upgrade.

Additional Mentor Graphics software costs $5,000 per application. Customers may port their own application software to the Compute Engine by licensing the product's C compiler and associated program development tools for $150,000.

From page 85

## General Dynamics system offered

The agreement states that both firms will sell the systems.

Terry Straeter, vice-president of General Dynamics' electronics division, called the Model 5000 an intermediate-level mainframe for resource-intensive applications such as modeling and simulation and said it maintains full file compatibility and access to IBM VM/CMS hosts.

The firm also announced a Model 5000T, which has Tempest features that prevent emissions of electrical signals, for intelligence agencies. The Tempest version is being tested for certification by the National Security Agency.

The Model 5000 and 5000T support up to 4M bytes of main memory (16M bytes of virtual memory), four user terminals, two high-resolution graphics terminals and peripherals. Both systems include dual 85M-byte Winchester disk drives and an IBM-compatible 9-track tape drive, the vendor said.

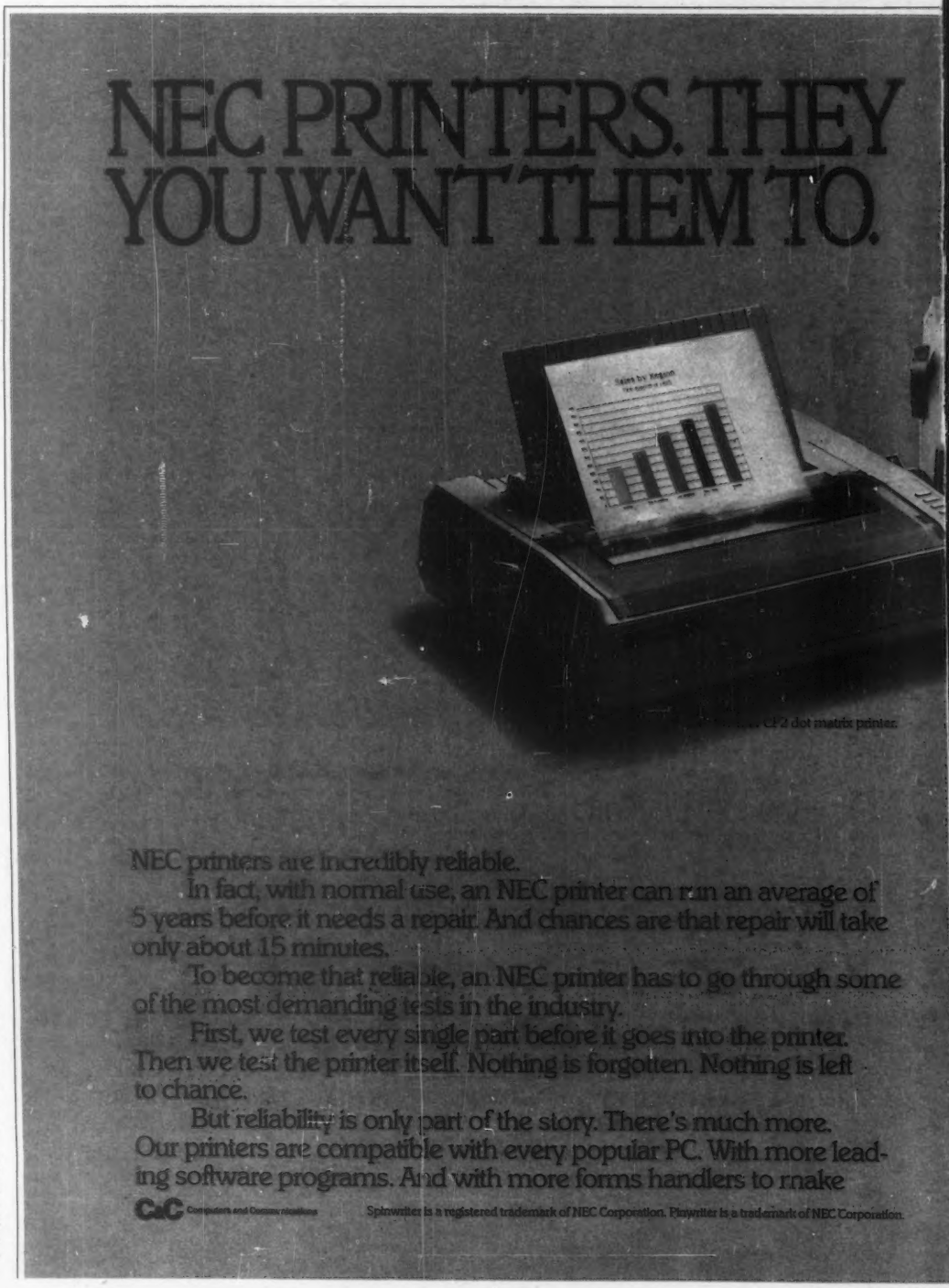
For mainframe off-loading, the units support networking with IBM mainframes, other Model 5000s and microcomputers, the vendor added.

"We are providing end users with DBMS-driven mainframe software applications as a dedicated resource," CCA President James Rothnie commented.

CCA's Model 204 relational DBMS is suited for defense and intelligence applications because of its applications development facilities, as well as fast retrieval and controlled access features, he said.

System prices, including the CCA software, range from $100,000 to $300,000, and the systems are currently available, according to the companies. The software portion costs $35,000 to $50,000, a CCA spokesman said.

General Dynamics also said it plans to offer four software lines for the Model 5000 series: office automation, program management and decision support, software engineering and computer-assisted engineering.



From page 85

## Transaction sales to mushroom

means a 74% growth in unit shipments and a 79% growth in the value of those shipments between 1984 and 1990, according to IDC, which based its research on its computer installation data file.

IDC predicted that in 1990 vendors will ship 119,000 transaction-oriented systems worth a total of $12.2 billion, compared with 53,000 units worth $7 billion in 1984.

Because of their typical dollar value, mainframe-class transaction processing systems will show the greatest amount of growth, according to IDC.

The report noted that in many installations, only the very largest mainframe can act as the host system but that the operating environment forces smaller systems to handle the on-line portion of the application.

IDC added that most of the transaction processing growth will be in the area of on-line processing, where the transaction is completed and all data bases are fully updated during the process of the request and output stages.

In on-line processing, there are no edit files developed for later batch updates of the central data base.

The report was compiled for IDC's Continuous Information Services clients.

From page 85

## Transaction units: no comparison

pal of Itom International in Los Altos, Calif. "The effort I started stalled. A fairly large number of people volunteered, but when the time came to make a decision they backed off and the project died," Serlin observed.

Officials of Tandem Computers, Inc. helped to organize that industry/user collaborative effort and have recently been calling for a standard benchmark.

Robert Jolls, director of data base products for the Cupertino, Calif., manufacturer of transaction processors, noted that such a standard will become more crucial as vendors and users drive toward a goal of 1,000 transaction/sec. He reported that high-end transaction processing systems are now approaching the 100 transaction/sec. level when running Debit Credit.

But Jolls added that even running Debit Credit leaves a customer unable to compare results for various processors unless each vendor runs the same transactions under the benchmark.

### Key feature of Debit Credit

Serlin noted that a key feature of a Debit Credit-generated rating is that, unlike a Mips rating, it considers factors such as a customer's individual software, communications and I/O systems. Mips is essentially a measure of processor speed.

However, how those non-processor factors are considered is a stumbling block for a standardized benchmark.

Lawrence Sherman, manager of product support programs for Stratus Computer, Inc. of Marlboro, Mass., warned, "The complication comes in when you talk to a particular customer about his requirements and his work load, which will differ greatly from this simulated work load.

"You have to remember that communications and data base demands are going to vary greatly from customer to customer and user to user," he said.

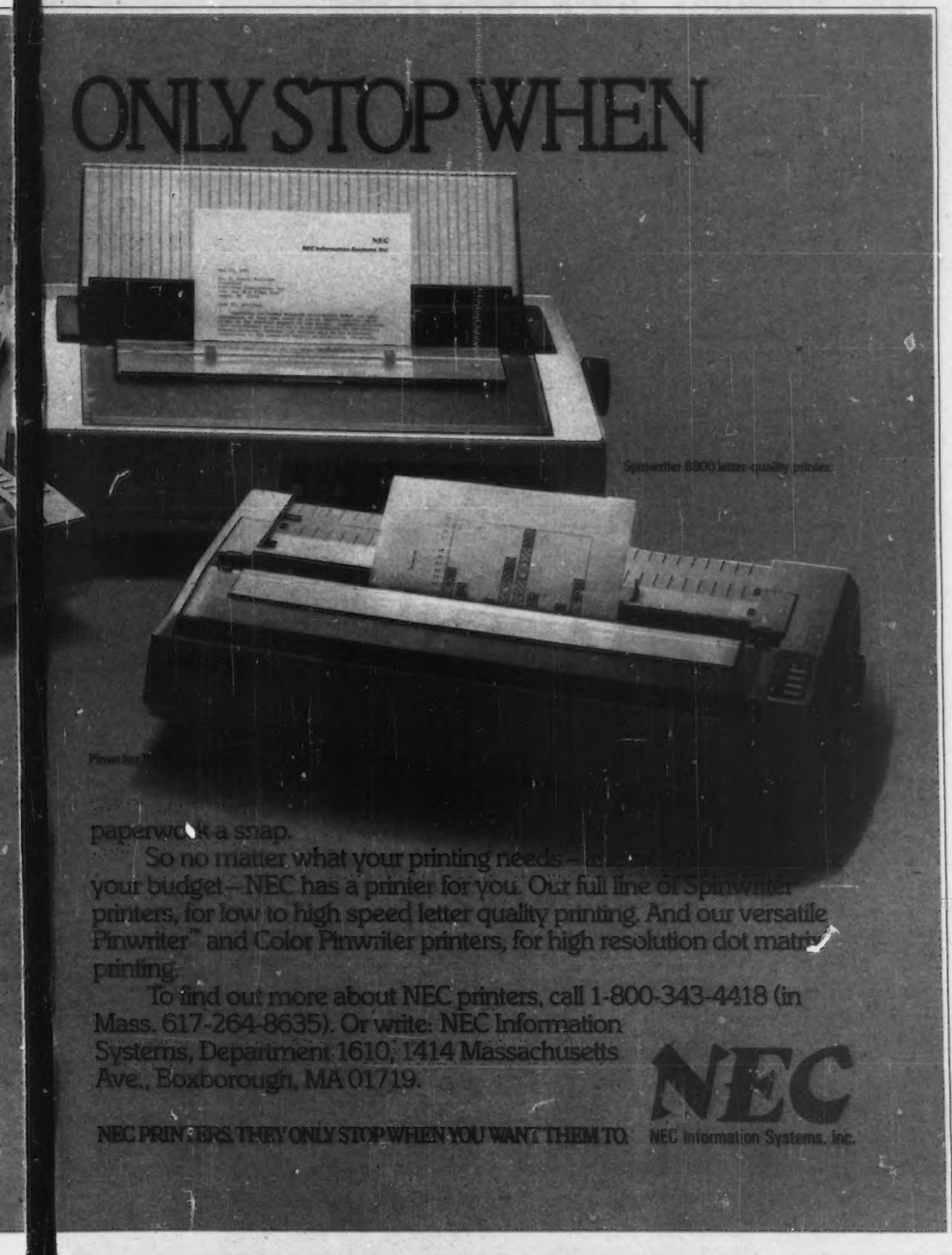
Sherman also suggested that even if vendors and users agree to set standards, they will need three or four standards for the different types of transactions, since a standard fit for the financial market may be inappropriate for a customer automating a factory.

### Fuel efficiency for autos

Good cautioned that if any benchmarks are accepted they should be looked upon as are the U.S. Environmental Protection Agency's fuel efficiency ratings for automobiles — guideline numbers to put products in perspective with relation to each other.

But another observer from the user sector concluded that performance standards are a pipe dream.

That manager, who asked not to be identified, said, "The real issue is how you measure the performance available to the end user. Reporting performance from the glass house isn't the way to measure performance. It's not what the users see. They are the only ones who know how the system is performing."



# SPECIAL REPORT

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## October 28

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# COMPUTER INDUSTRY

## Western Digital seeking reprieve from creditors

IRVINE, Calif. — A $13.4 million fourth-quarter loss has raised the possibility of a credit crunch at Western Digital Corp., knocking the company below its previously agreed level of equity in credit agreements with its banks.

The vendor of communications control boards and semiconductors is currently renegotiating the agreements with the creditor banks, which have temporarily waived Western Digital's equity requirements until Oct. 31.

William R. Benz, the company's vice-president of finance, said the revolving agreements with Bank of America National Trust & Savings Association, First Interstate Bank of California and Morgan Guaranty Trust Co. of New York cover a $40 million line of credit. He did not disclose the equity level specified by the bank covenants.

"I don't consider the situation a difficult one at all," Benz said. "The covenants have been restructured before. The bank group is solidly behind the company, and I don't expect any difficulty in compliance or any change in the nature of our relationship with the banks."

Western Digital's losses on $177.4 million in revenue for the year ended June 30 plunged the company into the red for fiscal 1985. The firm lost $4.6 million, or 71 cents per share, compared with profits of $7.8 million, or 49 cents per share, in fiscal year 1984.

Boosted by sales of $59.9 million compared with $41.7 million in the year-earlier quarter, Western Digital posted revenue growth of 56% for the year. But the sales increases came in lower margin, board-level products, such as Winchester disk controller boards, as the company shifted its focus away from higher margin controller chips.

## Trade surplus up, Cbema says

WASHINGTON, D.C. — The U.S. trade surplus for computers and office equipment rose by 28.4% in the first half of 1985, ending two years of decline. But the U.S. computer trade deficit with Japan continued to rise with a 7.6% increase, according to statistics released recently by the Computer and Business Equipment Manufacturers Association (Cbema).

Imports of computers and related equipment and parts from Japan reached $1.66 billion in the six-month period. Business equipment imports from Japan rose by 20.4% to $1.28 billion.

The U.S. surplus of computer and business equipment worldwide climbed to $2.82 billion during the first half of the year, up from $2.2 billion in the same period in 1984. The association predicted a surplus of about $5.5 billion for the full year if current economic trends continue.

The U.S. high-tech balance of payments has been generally declining since its peak of $7 billion for the full year of 1981.

In a related development, Cbema President Vico E. Henriques recently testified against proposed protectionist legislation before Congress. Criticizing a proposed 25% duty on imports into the U.S., Henriques blamed the nation's overall record trade deficits on low savings rates and the federal deficit.

"This creates a situation in which the dollar is overvalued and the cost of capital is too high, preventing industrial expansion," Henriques said. He predicted retaliatory measures by foreign vendors against an import duty.

## STC layoffs reach upper exec levels

By Clinton Wilder

LOUISVILLE, Colo. — Storage Technology Corp. (STC) recently announced it will lay off 500 more employees and consolidate several corporate functions in its effort to emerge from bankruptcy proceedings under Chapter 11 of the Federal Bankruptcy Act.

The mainframe storage device manufacturer will reorganize along functional rather than product lines, consolidating the management of its disk and tape drive operations under manufacturing, systems development, financial and MIS divisions. The resulting cutbacks of administration and management positions in the Denver area represent the highest level STC jobs cut to date, excluding the replacement of top management by the team headed by the firm's chief executive officer, Ryal R. Poppa.

STC's printer division, employing 400 people in Melbourne, Fla., is unaffected by the reorganization and will continue to maintain its own administrative functions.

The restructuring, part of the long-term business plan approved by STC creditors in July, will cut the firm's expenses by $50 million per year, a spokeswoman said. The reduction of the management payroll follows an overall reduction of 40% of the firm's employees since the Chapter 11 filing in October 1984. STC now employs fewer than 9,000 people, down from more than 15,000 one year ago.

"They've cut, and cut and cut, but they haven't really cut management positions before this," said Carol Lerner, a storage industry analyst at International Data Corp. in Framingham, Mass. "This is a major step for them and a smart move in facing the fact they're going to be a much smaller company." STC projects revenue of $650 million in 1985, compared with

Continued on page 94

■ Legal experts explain the semiconductor protection act/92

■ Digital Research moves into desktop publishing through a spinoff firm, Ventura Software/93

■ IBM began a dealer rebate program to help move its Personal Computer AT, XT and PCjr lines/93

## Outlook bullish for service start-ups

### Third-party service contracts expected to double by 1988

By Peter Bartolik

OSSINING, N.Y. — Tom McLaughlin ended his career at IBM in 1978 after 12 years spent climbing the rungs in field-engineering management. The decision to leave came when higher level executives rejected his proposal to cut prices on maintenance contracts.

"The manager said that the price of parts was so high [IBM doesn't] have to worry about competition," McLaughlin recalled in a recent interview in this New York suburb.

Today, third-party computer maintenance, much of it involving IBM equipment, is a booming industry and is attracting some of the larger equipment manufacturers. Total maintenance and service revenue in the U.S. was estimated at about $10 billion in 1984, and third-party providers — those companies servicing products made by others — raked in more than $1 billion of the total, according to Input, Inc. of Mountain View, Calif. But the third-party segment should double by 1988, according to Input. A study published last year by Arthur Andersen & Co. in cooperation with the Association of Field Service Managers projected that third-party revenue could reach $9 billion by 1990, much of it at the expense of manufacturers' service organizations.

After IBM executives rejected his recommendations in 1978, McLaughlin left to found Technical Support Services, Inc., now headquartered in an old high school undergoing renovation. It took 18 months to land his first account and five years to turn his first profit, he said. The privately held company, according to McLaughlin, posted revenue of $6 million last year, compared with $2.8 million the year before, and is on track for $10 million this year.

"We've had to slow down this year and get the management in place and the service in place for continued growth," McLaughlin said. The company carved its niche by providing depot maintenance for IBM point-of-sale and financial terminal equipment and in more recent years automated-teller machines. It now operates 17 depots throughout the country.

One fact of life that has not changed, however,

Continued on page 94

## Eagle seeks cash to make micro fly

GARDEN GROVE, Calif. — Shareholders of Eagle Computer, Inc. recently voted to add 10 million shares of common stock to the company's holdings. Capital from the sale of the stock will be used to help finance the introduction of new versions of Eagle's Turbo microcomputer, expected by year-end.

According to an Eagle spokesman, 95% of the outstanding shares of stock were represented at the shareholders meeting earlier this month, and 91% of those present voted in favor of the common stock increase. The addition gives Eagle 35 million shares of common stock. The 10 million shares will not be sold immediately, according to the spokesman.

Shareholders also voted to issue one million shares of preferred stock.

One of several microcomputer firms wounded by the shakeout in the IBM-compatible market, Eagle is attempting to rebound from substantial losses that last year forced the company to close its Los Gatos, Calif., headquarters and consolidate

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# Chip owners find copyright protection under 1984 act

FIFTH IN A SERIES

By Jerome J. Roberts
and Michael P. Brownell
Special to CW‡

A new form of proprietary protection for semiconductor chips, the Semiconductor Chip Protection Act of 1984, was signed into law last year by President Reagan and is administered by the U.S. Copyright Office. The protection it affords differs from copyright in many respects; this article and the following will summarize many of the fundamental aspects of the act.

Protection under the act is achieved by giving the owner of a mask work from which a semiconductor chip is constructed certain exclusive rights regarding both the mask work and the semiconductor chip product in which the mask work is embodied.

A mask work is the group of masks that are used like stencils in the manufacturing process of a semiconductor chip to create the three-dimensional pattern of metallic, insulating and semiconductor material inherent in the chip.

### EXCLUSIVE RIGHTS

The owner of a mask work who satisfies certain requirements of the act, as summarized below, will have the exclusive right to reproduce the mask work, import or distribute a chip in which the mask work is embodied and permit others to do both. The owner of a mask work may be the person who creates a mask work, the employer of an employee who creates a mask work within the scope of employment or a party receiving a signed written conveyance from the initial owner of all his rights in a mask work.

### COMMENCEMENT AND DURATION OF PROTECTION

Protection begins when two requirements are satisfied. First, the mask work must be fixed in a chip. This means, essentially, that an actual chip prepared from the mask work must be in existence. The chip need not necessarily be in final form.

Second, the mask work must be registered as explained below, or the chip containing the mask work must be distributed to the public for commercial purposes. Once the mask work has been fixed in a chip and registered or commercially distributed, protection continues for 10 years. However, if protection began as a result of public distribution and not registration, protection will only last for two years unless the pertinent mask work is registered within the two-year period.

### REGISTRATION

Formal registration of the mask work with the U.S Register of Copyrights is advisable for several reasons. First, without registration, protection lasts for only two years from the date the chip is commercially distributed. Registration extends protection to 10 years. Second, prompt registration provides the only way to effect the act's protection for a mask work during the period before commercial distribution of the chip but after fixation of the mask work. Third, a mask work must be registered prior to bringing an infringement action.

Registration is accomplished by submitting Form MW, a $20 registration fee and a deposit of certain identifying materials concerning the relevant chip to the U.S. Copyright Office.

In general, Form MW requests information concerning the title of the work, a description of the new or original elements of the work, the name and address of the current owner and the manner in which the current owner gained ownership in the event it did not create the work.

Regarding the identifying materials requirement, a registrant must submit a visually perceptible representation of each layer of a chip. The Copyright Office will accept any one of several formats concerning such representations. Further, if the chip has been commercially distributed, four reproductions of the actual chip must be deposited with the Copyright Office.

### THE MASK WORK NOTICE

The owner of a mask work protected under the act should consider affixing notice of protection to the mask work. Such notice serves to lay a strong foundation from which to prosecute infringement and to prevent innocent infringement. Although recommended, such notice is not a condition of protection. A notice comprising the following elements will constitute a satisfactory notice of protection:

- The words "Mask Work."
- The symbol "*M*" or the letter "M" in a circle.
- The name of the mask work owner or a recognizable or generally known abbreviation thereof.

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*Roberts and Brownell are attorneys with the law firm of Berman, Roberts and Kelly in Chicago. The firm's practice deals with legal issues related to procurement, distribution, management and protection of computer resources.*


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# IBM offers dealers sales incentives

BOCA RATON, Fla. — In an apparent effort to move its rumored swollen inventories of micros and peripherals, IBM has begun a dealer rebate plan as sales incentive for the IBM Personal Computer AT, Personal Computer XT and PCjr.

The dealer rebates, which began Sept. 1, could herald an early start to an expected wave of holiday season price cuts by most leading micro vendors [CW, July 29]. At least some of IBM's refunds, reportedly up to about $500 per machine, could be passed on to buyers in the form of discounts.

"We are offering a sales promotion in the form of incentives to dealers," said a spokesman for IBM's Entry Systems Division. "Fourth-quarter promotions are not uncommon. We did it last year in the same time frame."

Rebate terms vary for each computer model, but essentially give dealers a cash incentive for ordering a specified volume of XTs, ATs or PCjrs. The discontinued PCjr has already undergone one major price cut earlier this year.

Analyst Aaron Goldberg of International Data Corp. in Framingham, Mass., said the move was IBM's response to dealer sales of Big Blue micros equipped with lower priced, third-party hard disk drives, monitors and other peripherals. "It's simply an incentive for dealers, and I don't think the street price of the IBM machines will fall because of it," he said.

# Net America buys Nestar

**By Maura McEnaney**

PALO ALTO, Calif. — A Dallas-based start-up common carrier took a bold stance in the communications market recently through the acquisition of Nestar Systems, Inc., a leader in personal computer local-area networks.

Net America, Inc., builders of a nationwide Integrated Services Digital Network, recently purchased 80% of Nestar's stockholdings from Rank Industries America, Inc., a subsidiary of a UK-based travel and leisure services firm that had been an investor in Nestar since 1980. The value of the acquisition was not disclosed.

Net America was founded three years ago by former Northern Telecom, Inc. executives Ed Jungerman and Ray Cotton.

Net America cofounder and Chairman Sam Wyly also founded University Computing Co. and serves as chairman of Sterling Software, Inc., which recently acquired Informatics General Corp.

According to Jungerman, Net America still needs to complete payment on $250 million in debt and eq-

Continued on page 94

# Start-up to develop publishing software

**By Eric Bender**

MONTEREY, Calif. — A start-up firm that will develop and market computer-aided publishing software is being formed by managers from Digital Research, Inc.

Founders of the spin-off, Ventura Software, Inc., include John Meyer, Digital Research's marketing director, and two software engineers involved in the development of Digital Research's Graphics Environment Manager (GEM) software.

Ventura's first products, which will be announced early next year and shipped within a year from now, will provide desktop publishing capability within the GEM package, Meyer said.

Unlike most computer-aided publishing products now on the market, Ventura's offerings will run on the IBM Personal Computer and "give assistance to a user who is not really smart about how to lay out a page," according to Meyer.

The start-up plans to target several market niches, the first being users who already own desktop laser printers. Employees who work in corporate communications or in technical documentation also represent likely candidates, Meyer said.

While Ventura will be an independent software vendor for GEM and may sign a technology-exchange deal with Digital Research, the older firm will not make any investment in the start-up company.

Both Meyer and Digital Research President John Rowley told *Computerworld* that Digital Research decided against pursuing desktop publishing products at this time in order to concentrate on presentation graphics, graphics-enhanced applications and system software. Digital Research "has a tremendous number of opportunities it's already pursuing," Meyer commented.

Two characteristics of desktop publishing make it particularly appropriate ground for a start-up, he added. "First, it's not very well developed at the micro end. Second, it's a market that's going to require a different distribution channel."

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## Net America buys Nestar

uity financing before it can implement its network, and the company expects to begin offering common carrier services by the end of 1986. Until that time, Net America has been operating with venture capital, much of which comes from Wyly.

According to Nestar President Charles Hart, the acquisition gives Net America Nestar's corporate installation base of approximately 1,000 networks and access to the company's intrafacility data distribution technology.

The Net America merger also includes the assets of Zynar, Inc., a London-based local-area network firm that had been under Nestar management for more than a year.

From page 91

## Outlook bullish for service start-ups

is that the price of new IBM parts needed to service equipment can cost as much as an IBM service agreement. That requires small competitors to be fast on their feet by acquiring off-the-shelf parts from other suppliers at a fraction of the IBM list price and in-house manufacturing or repairing of frequently broken parts.

"If you buy parts from IBM, IBM is getting as much money anyway without having to provide the service," McLaughlin said.

Although IBM is required by a 1956 consent judgment to provide parts and documentation to users and third-party companies, it is not required to provide documentation on the schematics and components that make up a circuit board.

McLaughlin noted that a memory board for an IBM 4701 Finance Communication Controller is priced at $2,500, one-fourth the cost of the total unit.

Technical Support Services operates an electronics lab to draw up its own schematics and identify off-the-shelf integrated circuits that go into the boards. It also determines the functions of IBM proprietary integrated circuits; two boards with proprietary chips reportedly can be repaired by scavenging a third.

George Blagodatny, vice-president of engineering, said it takes two months to decode an IBM board, and new boards are introduced often, requiring the company to determine selectively those that it wishes to decode.

Because IBM builds nonstandard parts into its financial equipment, Technical Support Services has had to develop its own testing equipment, some of which it has begun to market. It also installs 4700 loop circuits and developed an alternative 4700 loop port module that it claims is more sophisticated and easier to use than IBM ports.

Committed to fast-growth goals, Technical Support Services has begun to branch out to offer service for 3270-type equipment and may move up further to service System/34, 36 and 38 processors.

Meanwhile, it wants to offer additional services to financial customers who use both IBM and non-IBM equipment, but McLaughlin claims at least two vendors have refused to provide parts.

Noting that one of those vendors has declared an interest in developing a third-party maintenance business, McLaughlin claims such refusal is a blatant attempt to restrain competition. But, despite his bitter denunciation, he expressed little concern about the current desire by mainstream vendors to enter his market. "With the exception of IBM, the manufacturers have their hands full servicing their own equipment," he said.


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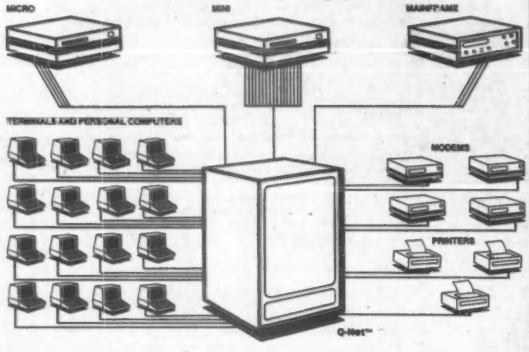



microscience corporation


From page 91

## Eagle seeks cash to make micro fly

its operations here. For the past year, Eagle has also been working out repayment plans with its unsecured creditors.

Last month, the company offered its trade creditors a repayment plan for $2.5 million in unsecured debt. The plan is designed to reduce Eagle's short-term debt, which reached $19.7 million in March 1984, to just under $3.1 million, a spokesman said.

Under the plan, debtors have the option of accepting the remaining 90% of the debt in the form of Eagle common stock at one share for $1 of debt or in a long-term unsecured note with 12% annual interest. Early this year, Eagle's unsecured creditors converted about $4.9 million in trade debt to equity.

Over the next few months, Eagle plans to introduce a line of multiuser supermicros and an enhanced version of its Turbo micro.

From page 91

## STC layoffs reach upper exec levels

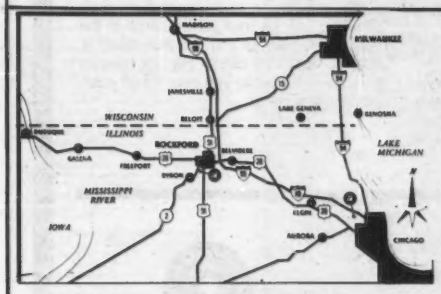
$808 million in 1984.

An STC spokeswoman said the firm expects to return to profitability and exit Chapter 11 by mid-1986. "That sounds realistic, if the industry holds together and [STC's] new products are delivered on schedule," said analyst Michael Geran of E. F. Hutton & Co. "They are now about half the size they were two years ago, and they have to bring their break-even point down to about $600 million."

Lerner said STC's return to profitability hinges on its ability to deliver a cartridge tape drive compatible with IBM's 3480 model.

The introduction of an automatic tape handler, which would speed the cartridge backup of IBM 3380-type disk drives, would greatly enhance STC's chances for recovery, Lerner added.

# POSITION ANNOUNCEMENTS

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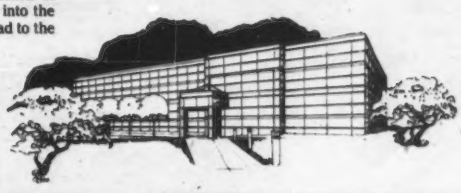
You should have a four-year degree, 3-4 years as a systems programmer, and 1-2 years supervisory experience. A working knowledge of large-scale IBM and IBM-compatible hardware and software is required including MVS, JES2, SMP, and SPF.

**IMS Systems Programmer**
Duties include the installation and maintenance of several IMS systems, locally at our Milwaukee Data Center and remotely at our Rockford Data Center. You will be responsible for problem resolution, system performance and tuning, and support of IMS-related products, including IMF, Logplus, SMU2, BTS-II, and Omegamon IMS. You will also work in modeling the IMS system and predicting the impact of work load changes.

You should have a degree in computer science or a related field, but we will consider equivalent experience. We have openings from entry-level to senior positions, commensurate with experience. Competence in COBOL, IBM Assembler, TSO/ISPF, SMP4 or SMP/E, and dump analysis is required at all levels.



**CICS Systems Programmer**
Duties include the installation and maintenance of several CICS systems, locally at our Milwaukee Data Center and remotely at our Rockford Data Center. You will be responsible for problem resolution, system performance and tuning, and support of CICS-related products.

You should have a degree in computer science or a related field, but we will consider equivalent experience. We have openings from entry-level to senior positions, commensurate with experience. Competence in COBOL, IBM Assembler, TSO/ISPF, SMP4, or SMP/E, and dump analysis is required at all levels. COPICS experience is a plus.

**MVS Systems Programmer**
Duties include installing and maintaining a variety of IBM and IBM-compatible software, identifying and resolving software problems, providing support and technical assistance for the Data Center staff and user community, and assisting in the design and development of software systems.

You should have a four-year degree or equivalent experience, 2-3 years as a systems programmer, and a working knowledge of large-scale IBM and IBM-compatible hardware and software including MVS, JES2, SMP, SPF, and BAL.

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**VM Systems Programmer**
Duties include installation and maintenance of a VM system in an SNA network. You will be responsible for performance and tuning, capacity planning, program product installations, and problem resolution.

You should have a degree in computer science or a related field, or equivalent experience. At least five years' experience is required, including three years as a VM systems programmer. You should be competent in BAL programming, generating VM systems, dump analysis, and VM tuning. Familiarity with MVS JCL, MVS utilities, VTAM, and PROFS would be a plus.

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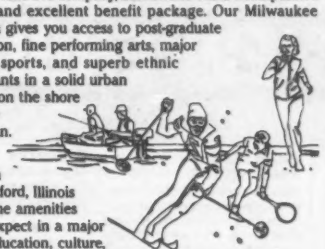

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**PROG.:** IBM OS & COBOL Mfg Sys. 1-2 yrs exp. req'd; **PROG.:** 2 yrs exp. with IBM mainframe & COBOL, Accounting Applications. Numerous Positions; **P/A:** IBM, IMS, CICS Req'd. Several Positions. 27-35K; **P/A:** OS/MVS CICS Retail or Distribution exp. a plus. 4 positions. 27-33K; **SR. ANALYST:** IBM OS/MVS. Redesign of ATM Network. Prefer 3 yrs exp. with CICS, SNA, NPDA & BYSYNC along with 5 yrs COBOL exp. 32-38K; **COMM ANALYST:** With MAP's, LAN or BROADBAND exp.; Salary OPEN; **PC ANALYST:** IBM PC with Lotus 123 & DBASE3. 30-36K; **O/A WORK STATION ANALYST:** Prefer Xerox, IBM PC, HP, Zenith exp. 30-36K; **CAD/CAM ANALYST:** CADAM or NC background. Prefer design exp. Salary OPEN; **ARTIF. INTELL.:** Exp. with LISP, PROLOG. Salary OPEN; **SYS. PROG.:** Strong CICS skill a must. Prefer OS/MVS. 42-48K; **SYS. PROG.:** NCP/VTAM a must. 42-48K; **SYS. PROG.:** VAX or HP3000 exp. Salary OPEN; **DBA:** IDMS exp. a must. Mid to upper 40's; **DBA's:** IMS or DB2 (If IMS exp., strong design or modeling req'd) (If DB2 exp., any exp. considered). Several Positions. Salary OPEN; **MGR. TELCOMM:** Data & Voice exp. Must have Management exp. Salary OPEN.

**CHECK-MATE OF WICHITA**
**P.O. Box 8520, Wichita, Kansas 67208, (316) 685-4144**

POSITION ANNOUNCEMENTS | POSITION ANNOUNCEMENTS | POSITION ANNOUNCEMENTS | POSITION ANNOUNCEMENTS | POSITION ANNOUNCEMENTS

## DIRECTOR

**WEST VIRGINIA NETWORK FOR EDUCATIONAL TELECOMPUTING SEARCH REOPENED**

The West Virginia Board of Regents seeks a Director for the West Virginia Network for Educational Telecomputing. WVNET is a distributed computing network providing and facilitating instructional, research, and administrative computing for 16 state supported institutions of higher education. The WVNET Director will assume full responsibility for management of the network host site in Morgantown West Virginia, directing 60 full time employees. This involves management of a $4 million operating budget, and developing capital equipment funding requests. The Director also will spearhead Board of Regents state wide planning for computing, and serve as primary interface with institutional presidents and computing authority regarding computing matters. The position demands a creative executive with significant experience in management of computing and information systems. The successful individual will have demonstrated competence in planning for and delivery of computing services in a similar environment. The successful candidate must hold a Master's degree and 10 years of relevant experience, including management in a computing environment or have equivalent combination of education and experience. Excellent communication and presentation skills are essential, as is state-of-the-art awareness of development in the technology and of computing in the educational arena. Management experience within a large academic setting or a computer network is desirable. Salary will be commensurate with the qualifications of the individual. Nominations and applications should be sent to:

Dr.W. Max Ivey at West Virginia Network for Educational Telecomputing
837 Chestnut Ridge Rd.
Morgantown, WV 26505.

Applicants should furnish the names, addresses, and telephone numbers of five references. Closing date is November 4, 1985. EOE

**COORDINATOR FOR COMMONWEALTH CAMPUSES**

Department of Computer Science

The Pennsylvania State University is looking for a person who is interested in an exciting, challenging nontenure track position in Computer Science where you can have a significant influence on undergraduate education and the associate degree program in Computer Science. The position includes undergraduate teaching at the University Park campus as well as the monitoring of faculty on seventeen Commonwealth campuses. Limited travel is involved. Undergraduate teaching experience in Computer Science, including competence in COBOL, is required. A Master's degree is also required, although a Ph.D. is preferred. To learn more about this fine opportunity send a resume with names of three references to:

**Professor Joseph M. Lambert, Head**
**Department of Computer Science**
**The Pennsylvania State University**
**333 Whitmore Laboratory**
**Box CW #1**
**University Park, PA 16802**

Applications will be accepted until October 30, 1985.

An Equal Opportunity/ Affirmative Action Employer.

## SYSTEMS NATIONWIDE POSITIONS

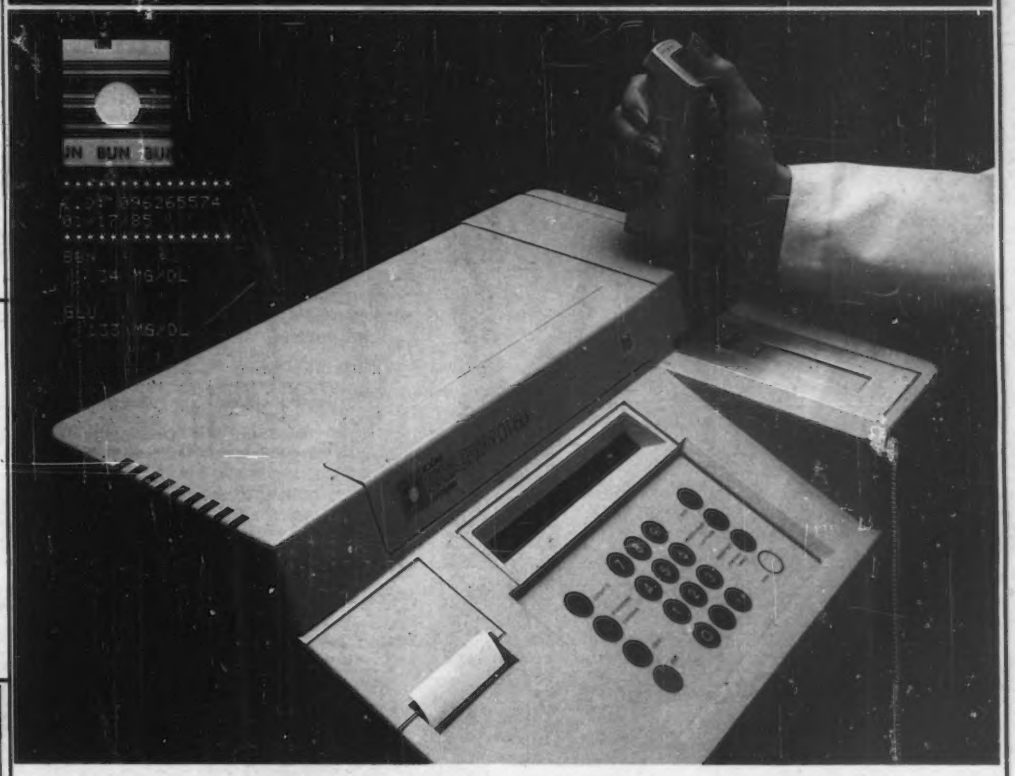
| | |
|---|---|
| OS/MVS, CICS, IMS/Westcoast | $45K |
| OS/MVS, CICS, JES2, VTAM/OLTs | $44K |
| Communications Specialist/Mississippi | $35K |
| Conversion from DOS to OS/E. Coast | $39K |
| Subsets of SNA (DCA or DIA)/W.Coast | $50K |
| Capacity Planner OS/MVS/Nebraska | $37K |
| OS/MVS, Tuning, Internals/Alabama | $35K |
| OS/MVS, VM, CICS, IMS, JES2/W. Tx. | $35K |
| OS/MVS, IDMS DB, Utility/Gulf Coast | $45K |
| MVS/XA Internals/Dallas | $45K |
| CICS Internals/Dallas | $45K |
| IMS Tuner/East Coast | $35K |
| CICS Internals/S. Texas | $40K |
| DOS/VSE, VM/Mississippi | $40K |

I'm Dennis Jiles and listed above are a few of my client companies needs nationwide. I have 20 years in Data Processing with 10 years in Systems Management. Our agency is unique where we specialize in Data Processing Career Management. Let me use my experience to help your career needs. Please call collect (318) 222-1000 or mail resume to:

**Executive Consultants**
**Attn: Systems Specialist**
**3331 Youree Drive, Suite 100**
**Shreveport, LA 71105**


*Imagine finding ingenious applications for technology that turns complex blood tests into routine office procedures.*

*What an exciting time to work at Kodak.*



Now, the blood tests critical to physical examinations can be completed by a Kodak desktop analyzer right in the physician's office—in minutes.

This compact marvel is the result of a number of Kodak innovations. Among the most unique is a new fiber optics system that gathers information and reports it to a microprocessor for analysis. We're already looking at new applications for this concept. What an exciting time to be working at Kodak.

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The CS or EE with motivation, talent, and determination to continue intellectual growth can find a stimulating career at Kodak. From the first, newcomers face challenges as members of project teams—working in an environment that encourages initiative, recognizes ingenuity, and rewards contributions. This is high-tech excitement. And Kodak is where it's happening. Send your resume to Personnel Resources, Dept. DCPW, Eastman Kodak Company, Rochester, NY 14650.

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## SYSTEMS PROGRAMMER

**(Lake Tahoe Resort)**

Work on duel IBM 4300's, Series I, 5520 and PC's. Two or more years experience with DOS/VSE, VM, VTAM, NCP and CICS required with EDX knowledge a plus. If you are interested in implementing new projects and expanding your systems knowledge, please send your resume to:

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**ALASKA**

**University of Alaska Computer Network**

Interested in a challenging position in a unique and exciting environment? The University of Alaska Computer Network is a 5,000 mile communications network linking 13 campuses with six computer systems. We have openings for experienced Systems Programmers for the implementation and maintenance of an IBM 4381 mainframe with MVS/SP, JES3, ACF/VTAM, NCP, and Cullinet IDMS. We are in the implementation cycle where your experience and creativity will help continue to keep us on the frontiers of computer technology.

SYSTEMS PROGRAMMER II -
(Annual Salary $42,764 - $71,240)

As a minimum, the successful applicant must possess knowledge of IBM systems software, skills in assembly level programming, and the ability to maintain, develop, and install computer operating systems.

Please send a letter of application, your resume, and three professional references to:

Statewide Office of
Human Resource Development
University of Alaska
Room #1, Bunnell Building
Fairbanks, Alaska 99775-5180

Closing date: October 7, 1985

*The University of Alaska is an AA/EO Employer and Educational Institution*

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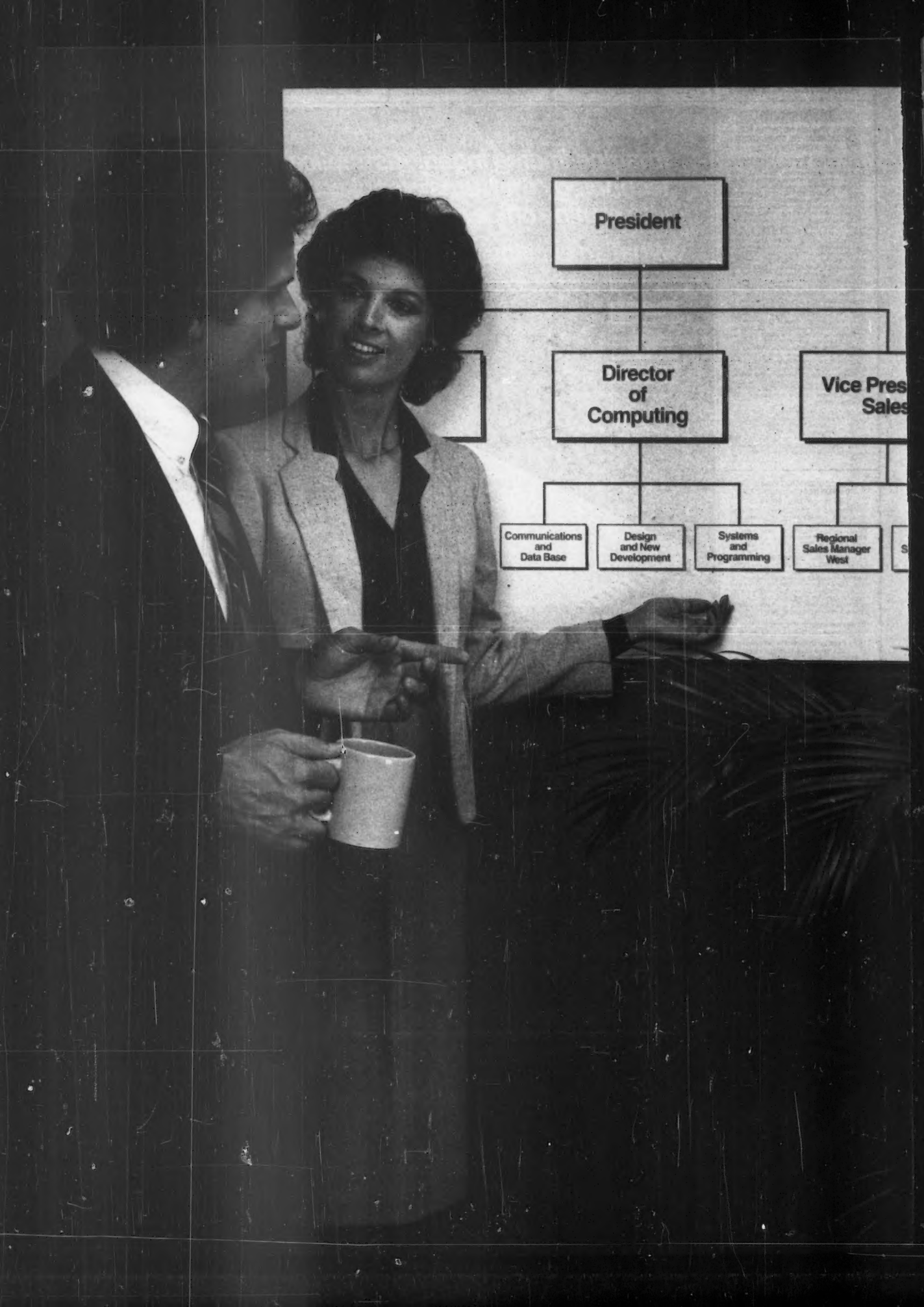
You have them of your career. We have them of our products. Together they can yield great efforts in the areas of research, design, and development of advanced commercial electronics.

As our Scientific Programmer Specialist you will be responsible for the analysis, design specification; and technical advisement of the programmer/analyst assigned to the program Chief Technical Authority for the implementation of a relational database using free text search algorithms. You will also oversee the integration of the database to the communication and user functions of the system. For this position, you should have strong presentation skills and be able to assume total responsibility for the database effort as required. A technical degree and five years' experience are required.

Send your resume to Lockheed Electronics Company, Inc., Employment Office, Dept. SPC, 1501 U.S. Highway 22, Plainfield, NJ 07061. Lockheed is an equal opportunity, affirmative action employer. U.S. citizenship is required.

**Lockheed Electronics Company, Inc.**
**Giving shape to imagination.**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Sales
Communications and Data Base
Design and New Development
Systems and Programming
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# Announcing the 1985 National Computer Career Conference

## Over 6,000 career opportunities, $21,000 – $108,000
## Call Dave Grinnell at 1-800-821-7700, extension 800B
## from 8 am to 8 pm any day this week

Do you know if you're in the best position? Are there other opportunities that will provide leading-edge exposure, greater income and maximum potential for long-term career growth? Are there better opportunities in other areas of the U.S. or Canada?

### We'll provide all the facts

The Source Edp Computer Career Conference is designed to help computer professionals evaluate the current job market, and find out where they stand professionally and financially—all in complete confidence. Key information systems executives in your area and across North America will be available throughout the Conference—at your convenience—to explain their long-range plans and where you might fit in.

### Exploring has never been easier

Firms participating in the Conference represent a broad cross section of user, consulting, vendor and service organizations. They are diverse in industry, size and location, and range from the dynamic new start-up to the larger well-established, growth-oriented company. Compensation levels are outstanding.

In all, over 6,000 specific positions are represented. The Conference offers you a convenient way to investigate a wide variety of career options—all in complete confidence. There are no forms to fill out—nor is a resume necessary. You will meet only those firms that you are interested in—or that have interest in you. Discussions will be held in strict privacy, at a time and day that's most convenient for you.

### How to participate

The Source Edp Computer Career Conference is scheduled in a city near you soon. There is absolutely no charge for your involvement or attendance since participating client companies will assume our fees. And, all inquiries are held in confidence. To ensure your reservation and to learn about Conference dates in your area, call Dave Grinnell today at 1-800-821-7700, Ext. 800B. Or write: Career Conference Director, Source Edp, Dept. C-5, P.O. Box 7100, Mountain View, California 94039. Following is a summary of the kinds of positions and compensation offered.

---

### Applications Programming
### $23,000 – $54,000

Those with two or more years experience in applications programming will have an opportunity to learn new skills while ensuring maximum compensation. Positions exist in environments ranging from the largest scale mainframes through mini and microcomputer user, consulting and vendor firms.

Positions are available using a variety of languages including COBOL, PL/1, Assembly, RPGII, PASCAL, "C" or BASIC; operating systems like OS/MVS, VM/DOS/VSE, UNIX, AOS, and data base and data communications like IMS, CICS, INFOS, TOTAL, IDMS, ADABAS, System 2000, ADDS-0 and more. Significant opportunities exist for those with solid programming backgrounds to move into systems development, software, EDP auditing or systems evaluation.

### Software Development/ Software Engineering
### $28,000 – $60,000

Individuals with two or more years of software design and development or software engineering experience will be able to gain experience in and develop some or all of the following: operating systems, capacity planning and performance enhancement tools (OMEGAMON, MEAGAMON), compilers (C, PASCAL, ADA), I/O and device handlers and program generation tools. This development work will take place on a variety of systems including IBM 3083's, VAX 11/780's, Tandem Non-Stop, and variety of other mini and micro systems (Motorola 68000, Intel 8080's).

Many of the companies participating in the Conference offer formal training and experience in leading-edge technology as well as day-to-day contact with some of the top technical professionals in the country. A number of opportunities with new venture companies offer exceptional growth and equity potential.

### Data Base/Data Communications
### $25,000 – $55,000

Many openings exist for individuals with backgrounds in database and/or data communications. Exposure to a variety of technologies is possible, including: IMS DB/DC, ADABAS, IDMS, TOTAL, FOCUS, CICS, ENVIRON/1, TCAM/NCP, SDLC, SNA, X.25 and other database and/or data communications software.

Companies participating in the Conference include major computer and software manufacturers, Fortune 500 companies, prestigious consulting firms as well as many emerging high technology firms.

### Systems Programming
### $24,000 – $55,000

Opportunities provided by client firms that are participating in the Conference are broad and unique. Those with at least one year of systems programming experience will be able to strengthen their skills as well as gain knowledge of some or all of the following: UNIX, CPM, CICS, IMS, OS/VS, DOS/VS, ADABAS, DL/1, modems, duplex lines, switches, and more in both mainframe and mini or micro environments. Assignments range from program development and enhancement to systems support.

### EDP Auditing
### $25,000 – $58,000

Exploding opportunities exist in EDP auditing. There are many openings for those professionals who have a good technical background in programming or design plus exposure to accounting applications. Large firms are expanding their EDP auditing departments and are providing specific training in auditing for Programmer Analysts—particularly those with over two years experience.

### Technical Writing
### $21,000 – $38,000

Those Technical Writers/Documentation Specialists who have writing experience with state-of-the-art hardware and software are now in a position to capitalize on those skills due to high demand. Positions range from creating technical documents for users to the development of marketing and sales brochures for new products. Because of the growth of new hardware products and new software packages, the need for good technical writers has grown rapidly. In addition to a great need for creative writing, there are also many opportunities for the more senior level writers to become Technical Writing/Documentation Managers.

### Systems Development/ Management Consulting
### $31,000 – $78,000

A broad variety of openings exist for persons with systems design and development backgrounds ranging from systems analysis to senior project management and/or management consulting. Many leading-edge communications and data base-oriented information systems projects are being planned by Conference client firms. In addition, a number of small to intermediate size firms are just beginning to make their initial thrusts into computing—especially in mini/micro areas—and need new applications development expertise. Several nationally-respected management consulting firms will also be represented for those persons who are interested in a variety of new development assignments with high visibility to corporate management.

### Sales, Marketing and Technical Marketing Support
### $23,000 – $108,000

Those professionals who attend the Conference will learn about new opportunities in computer sales, marketing and marketing support. Many alternatives exist in various product areas including mainframes, mini/microcomputer technology, terminal systems, time-sharing, facilities management, proprietary software packages, OEM's, consulting and more. Many firms are just now entering new markets and will provide exceptional career and compensation growth potential—as well as equity participation.

**Our National Career Conference is happening now in 36 major metropolitan areas across North America. Call 1-800-821-7700, extension 800B to ensure your reservation.**

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# Map Out a New Career at CIBER

With many companies, the prospect of an exciting career with long-range opportunities is limited by one element—location. CIBER knows that the environment in which you work and live affects your personal satisfaction. A career with our rapidly-expanding consulting firm will allow your future to take shape in a choice of data processing markets.

Our employees are salaried and receive company paid benefits including relocation. If you have a minimum of 3 years experience, we can offer you a wide range of technical opportunities in diverse industries using the latest systems and computer technology.

Openings are currently available in the following locations for data processing professionals who are experienced in these preferred fields.

**Phoenix**
OS/MVS, COBOL
IMS DB/DC, CICS
VSAM, FOCUS
SAS, FINANCIAL
SYSTEMS
INSURANCE
SYSTEMS, HOGAN

**Detroit**
IMS DB/DC, ADF
COBOL
IDMS, ADS/O
FOCUS, CICS
MARK IV, MICRO
ASSEMBLER
HP3000, TI990

**Atlanta**
COBOL, FOCUS
CICS/VSAM or DL/1
IMS DB/DC, IDMS, ADS/O
OS/MVS
FINANCIAL SYSTEMS
INSURANCE SYSTEMS

**Houston**
IDMS
ADS/O
IMS DB/DC
PL/1, COBOL
FOCUS
CICS, VSAM

**St. Louis**
COBOL, CMS/RAMIS II
IMS DB/DC
CICS
TOTAL, MANTIS
VAX, FORTRAN

**Denver**
ADABAS, NATURAL
IMS DB/DC
IDMS, ADS/O
COBOL, PL/1, OS/DOS
IBM S/38
McCORMICK & DODGE MILLENNIUM
FOCUS

**Sacramento**
ADABAS, NATURAL, COM-PLETE
IDMS, ADS/O
CICS, ON-LINE OR OTHER
DB SYSTEMS, COBOL

**Dallas**
IMS DB/DC, COBOL
CICS, DL/1
INSURANCE/HEALTH SYSTEMS
BANKING SYSTEMS/SYSTEMATICS
TANDEM, TAL, PATHWAY
HP 3000, FORTRAN
IBM/ALC
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**A promotion has created an opportunity in our System Security group for a data processing professional with a working knowledge of the ACF-2 Security System.**

**We are a progressive system security group responsible for all security components of a large multiple CPU centralized data processing facility. As a member of our system security group you will utilize the latest technological tools and techniques in this challenging environment.**

**Primary responsibilities will include:**

- **Administration of corporate data and physical security policies/procedures.**
- **Technical administration of corporate data security procedures and techniques in support of MVS, VM/CMS, CICS, IDMS.**
- **Implementation, maintenance and testing of the corporate disaster recovery program.**

**Primary experience should include: ACF2 Data Security, OS/JCL and OS Utilities; TSO/SPF, and ROSCOE, IBM PC's, M&D Millenium, SDSF, RUSCO Access System, and Telecommunications.**

**Mail resume and salary requirements to the Employee Relations Department, or call 214-754-1171. Principals only please.**

**Central and South West Corporation**
P.O. Box 660164 • Dallas, Texas 75266-0164

**Central and South West Corporation is one of the nation's leading electric utility systems, having annual revenues of more than $2 billion. With corporate headquarters in Dallas, CSW serves more than four million people through its operating companies in Texas, Oklahoma, Arkansas and Louisiana.**

**Equal Opportunity Employer**

# MVS AND CICS SUPERSTARS
## $55,000-75,000

Do you have an exceptional aptitude for systems programming?

Did you know more about MVS and CICS after one year than do people with 10 years' experience?

Are you looking for a project that challenges you technically and uses the latest features of MVS and CICS?

If the answer to these questions is yes, you are the perfect candidate for a job at Oracle Corporation.

We are currently interfacing our DB2-compatible DBMS to MVS and CICS.

Oracle runs under MVS as a subsystem, and makes extensive use of Cross Memory Services.

If dual address space debugging and performance optimizations are the kinds of technical challenges you're looking for, this is the place.

While the majority of our technical staff holds CS degrees from the top schools in the country, your compensation will not be determined by your degrees (if any) or the number of years of experience that you have--just by your ability and discipline.

Oracle Corporation is the fastest-growing privately-held software company in the world. And, since our company is 85% owned by our employees, we offer a substantial piece of equity to go along with salaries that are far above industry standard.

Please send your resume to the Development Administrator at: Oracle Corporation, Department 122, 2710 Sand Hill Road, Menlo Park, CA 94025. No phone calls, and principals only, please.

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## NEW ENGLAND

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| CONSULTANTS | $45,000 |
| SYS MGR - BANKING | $43,000 |
| SYS PRG 360/43XX | $40,000 |
| MANUFACTURING | $40,000 |
| BANKING/FINANCIAL | $40,000 |
| CICS COMM/MACRO | $38,000 |
| TANDEM/TAL | $37,000 |
| MAINE, NH, VT, RI | $35,000 |
| EDP AUDIT | $34,000 |
| HEALTHCARE | $33,000 |
| INSURANCE | $32,000 |
| FOCUS/RAMIS/NOMAD | $30,000 |
| COBOL/PL-1 | $30,000 |

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Due to client demand, Berger & Co. is expanding its technical support team. Berger & Co., Denver's leading information management consulting firm, is offering our clients ongoing technical support services, as well as project-oriented systems consulting. To become part of our team, qualified individuals must have:

- 3+ years of systems programming on VM/DOS/VSE or MVS or OS/VSI
- Applications experience
- Desire to work in a multi-client environment
- Professional approach

To get the challenges . . . you must get the opportunities. Berger & Co. offers professional and technical diversification as well as better than competitive benefits. We invite you to forward your resume, including salary history, in strict confidence.

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is looking for technically skilled and creative software people. Position offers opportunity to work on challenging problems in a variety of disciplines from office automation, communications to real-time data manipulation.

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DATA PROCESSING PROFESSIONALS

# APPLY NOW FOR ANY OF THESE 1,304 JOBS PAYING $30,000 to $105,000

**This special service is provided by CSI free of charge and without obligation to applicants who feel that they can qualify for the following positions with the companies listed below:**

Programmers/ Analysts (All levels—IBM, BURROUGHS, NCR, Honeywell, DEC-VAX, WANG, PC's; COBOL, FORTRAN, PL1, DL1, BAL, TSO, FOCUS, CICS, UNIX, IMS, DOS/ VSE, OS/ MVS-XA); Applications Programmers; Software Engineers; Software Analysts; Database Management Specialists; EDP Instructors; Software Support Specialists; Data Processing Managers; Data Security Analysts; MIS Specialists; Software Programmers; Customer Support Representatives; Systems Performance Analysts; Methods Analysts; Consulting Analyst ISS; Senior Systems/ EDP Auditors; EDP/ MIS Services Supervisor; Office Automation/ Word Processing Specialists; Financial Analysts; Controllers; Data Communications Specialists; Network Communications; Automation Engineers; Field Engineers; Microprocessor Design; Digital/ Analog Designers; PC Board Designers; CAD/ CAE Engineers; Computer Engineers.

**ADP, Inc. / A.O. Smith Data Systems / ASEA Industrial Systems / Bell Aerospace / Burroughs Corporation / Chemical Abstract Co. Container Corporation of America / Lee County Electric / Mead Corporation / NCR Corporation / Pacific Gas and Electric Co. Burroughs-Wellcome Co. / Cigna Corporation / Walter Kidde Co. / Corning Glass Works / Allied Bendix Enterprise Companies / Northrop**

The companies listed above have 1,304 positions available for this year. Upon receipt of your application, CSI will match your qualifications against the job specifications outlined by our corporate clients. You will receive confirmation of your application, plus details on all companies with applicable job opportunities as they arise. Upon receipt of your application, we will also prepare for you—free of charge—a personalized salary comparison, relating your current position and compensation to other professionals in your field.

PLEASE PRINT CLEARLY IN THE SPACE PROVIDED FOR EACH ANSWER; DO NOT ENCLOSE ANY OTHER RESUME.

**PERSONAL INFORMATION:**

Name _____

Home Address _____

City _____ State _____ Zip Code ___ ___ ___ ___ ___

**Confidentiality Options** (Check one):
- ☐ Put me on Priority Resume Status so interested companies can contact me directly; only current employers will be denied access.
- ☐ I would like to screen all job opportunities prior to revealing my identity to interested employers.

Minimum asking compensation: $_____ per year. Are you willing to relocate? ☐ Yes ☐ No

How soon could you start a new position? ☐ Immediately ☐ Other _____

**EDUCATION**

| School | Major | Degree | Year | No Degree |
|---|---|---|---|---|
| | | | | ☐ |
| | | | | ☐ |
| | | | | ☐ |

Honors, Awards, Professional Registrations, or Licenses: _____

**SUMMARY OF PROFESSIONAL EXPERIENCE:**

Primary Occupation: ☐ Data Processing ☐ Engineering ☐ Finance/ Accounting Number of years in primary occupation _____

**1) Current or most recent job title:** _____

Dates: ___ ___ / ___ ___ to ___ ___ / ___ ___ Current Compensation $_____

Company Name: _____ City _____ State ___ ___

Responsibilities: _____

Accomplishments: _____

**2) First previous job title:** _____ Dates: ___ ___ / ___ ___ to ___ ___ / ___ ___

Company Name: _____ City _____ State ___ ___

Responsibilities: _____

Accomplishments: _____

**Statement of Job/ Career Objectives:** _____

CPW 01

**Mail your application to: CSI – Career Resource Division, Suite 902, 1675 Palm Beach Lakes Blvd., West Palm Beach, Florida 33401**

CSI

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# HARDWARE/ SOFTWARE DEVELOPMENT

Syntrex is a dynamic growing manufacturer of sophisticated office automation products and systems. Our philosophy that outstanding people can assume responsibility, make decisions and stimulate change is the key to our dramatic rate of growth and success. In just 6 years Syntrex has grown from zero to almost $60 million in annual revenues by developing and installing office automation systems in over 1400 firms including some of the largest in the country.

If you are a software or hardware professional who can start with concepts and produce deliverable products, Syntrex is the perfect place to bring your skills and vision for an opportunity rich in challenge and rewards.

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Please contact Tom Laska at (201) 542-1500 or (800) 526-2829 or send your resume.

We are seeking individuals with a BS Degree in Computer Science or Electrical Engineering and at least 1 year experience in one or more of the following areas:

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- software continuation/support
- office automation applications
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- local area networking
- high level languages (UNIX/C, PASCAL, PL/1, and ADA)

**HARDWARE**
- microprocessor design
- peripheral devices
  - printers - floppies
  - disk drives - tape drives
- system design/architecture
- diagnostic programming
  - familiarity with 8086 assembly and/or C
  - board and system level responsibility

In addition, we have the following key managerial opportunity:

**SOFTWARE SUPPORT MANAGER** — B.S. Degree in Computer Science or Electrical Engineering with 5 or more years of increasing project responsibility in software development. Should possess supervisory experience and good interpersonal skills.

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# Sr. Programmer Analyst

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FELEC Services, Inc., a wholly owned subsidiary of ITT Federal Electric Corporation, is involved in the maintenance and operation of sophisticated radar, computer and communications systems worldwide. We currently have a senior level opportunity available at our headquarters office in beautiful Colorado Springs.

Responsibilities will include program maintenance and development, system/program analysis and design, dump analysis and task/project leadership.

Applicants must possess excellent written and verbal communication skills. A Bachelor's degree in Computer Science or MIS is required, although experience may be considered in lieu of degree. Formal training and expertise with ANSI COBOL 74, Honeywell Level 66/DPS-8 systems, DMIV and Honeywell IDS/II TP systems required. Minimum 4-6 years' programming analysis experience with at least 3 years' COBOL programming also required. Project leadership, supervision, GMAP, FORTRAN and other DP related experience a plus.

FELEC Services, Inc. offers a comprehensive benefits program including life/medical/dental insurance, investment and savings plan, pension plan and tuition assistance.

**U.S. Citizenship required**

If your background qualifies you for this opening, please forward your resume (including salary history) to: **Employment Supervisor, Dept. CW-831, ITT FELEC Services, Inc., P.O. Box 15012, Colorado Springs, CO 80935**

**An Equal Opportunity Employer, M/F/H/V**

ITT FELEC Services, Inc.

## RESEARCH SCIENTIST

Research and development in the areas of distributed query and update processing in distributed database management systems. Transfer of this technology to operating divisions by using the technology in DDTS/RAM project. Design and implement distributed execution environment of federated databases, with emphasis on multi-vendor computer communications, distributed concurrency control and interprocess communication among different operating systems. Performance evaluation of concurrency control and distributed execution modules of heterogeneous distributed database management systems using SIMULA and SIMPAS.

Requires MS degree in Computer Science. Requires six months experience with design and development of software system for distributed database management system with emphasis on distributed concurrency control, distributed commit protocols and distributed execution policies; with communications protocols, including transport layer protocols ITP, TCP and DSA; also requires six months experience with Multics and "C" programming languages. Salary $2850 per month.

Submit resumes to:

**Mr. Dick Hewetson #5-48**
**Minnesota Job Service**
**300 Second Avenue South**
**Minneapolis, MN 55401**

PRINCETON INFORMATION
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| ADABAS P/A (1 yr) | 25-35K |
| IDMS or CICS P/A (2 yr) | 25-35K |
| DBA (ADABAS, IMS, IDMS) | 35-45K |
| Jr. DBA | 29-37K |
| MVS Sys Prog | 27-40K |
| CICS Sys Prog | 25-40K |
| VAX, FORTRAN/LISP | 28-39K |
| Software Eng (M68000, Intel) | 30-45K |
| SQA-Mil Standards | 30-45K |
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P.O. Box 747
Northampton, MA 01061

# FLORIDA OPPORTUNITIES

Lockheed Space Operations Company (LSOC) is the prime contractor to NASA and the U.S. Air Force for the Shuttle Processing Contract. This long-range contract involves our employees in the support engineering of the orbiters' on-board equipment and associated ground support systems. We presently have a number of special opportunities for Computer Professionals having the appropriate experience and qualifications in the following areas:

## DB DESIGN SPECIALIST

The candidate selected for this DB design specialist assignment will have an in-depth background demonstrating the ability to assume direct responsibility for the design of large DB structures which are employed in a high volume, on-line, transaction-oriented environment. We require three or more years' experience in DB Design utilizing Cullinet IDMS or Honeywell IDS II DB software. Further working knowledge will involve through-put consideration, clustering techniques, as well as effective sizing knowledge. A background in Honeywell is preferred, however, IDMS with Cullinet is also sought.

## HONEYWELL

Immediate opportunities for Computer Professionals to join our team of Programmers and Programmer Analysts. These individuals are involved in the development, implementation and support of a large scheduling and production system based on a Honeywell DPS-8 environment utilizing COBOL. Preferred applicants will possess three or more years' experience and have a strong working knowledge of DM-4.

## REAL-TIME SCIENTIFIC

This opportunity will afford you a unique step into the Manned Space Program. You will be involved in the software support of our real-time launch process systems, which is a distributed network of over 500 minicomputers utilizing FORTRAN and a space system unique software (GOAL). Qualified candidates will have a background of real-time data acquisitions within a multicomputer environment.

## C/UNIX PROGRAMMER

We are seeking a unique individual who will be involved in the installation and support of our new intelligent stations which will be hosted by a VAX.

Lockheed Space Operations Company is located in the Florida Space Coast resort area. These high level career opportunities offer a very competitive salary and benefits package that is untaxed by either state or local income taxes. If you are qualified in any of the above areas and are interested in sharing in the adventure of the exciting space program, we suggest that you call Mr. Don Quirk collect at (305) 268-4070 or send your resume in confidence to: LOCKHEED SPACE OPERATIONS COMPANY, P.O. Box 2807, Titusville, FL 32781-2807.

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- IBM S/38, S/36, S/34 - RPGII, RPGIII
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- VAX/VMS, POP-11/CTS 300, DIBOL, COBOL, PASCAL, MCBA, /IDMS, RDB
- ENGINEERING/FORTRAN, REAL-TIME, MANUFACTURING SYSTEMS
- MICRO ENGINEERS, 68K&00, 6500, 8086
- PROJECT MANAGEMENT, DESIGN ANALYST

Rand Systems Corporation has eleven years of experience serving clients in Southeastern Michigan. Members of our technical staff are challenged with exiting state-of-the-art projects and are provided extensive benefits; including fully paid health, medical and dental coverage, paid overtime and annual bonuses. Please call Mr. Rand at 313-855-6877 or send resume:

RAND SYSTEMS CORPORATION

**RAND SYSTEMS CORPORATION**
7071 Orchard Lake Road, Suite 305
West Bloomfield, MI 48033
(313) 855-6877

*All replies held in strict confidence*

POSITION ANNOUNCEMENTS | POSITION ANNOUNCEMENTS | POSITION ANNOUNCEMENTS | POSITION ANNOUNCEMENTS | POSITION ANNOUNCEMENTS

## PROGRAMMER ANALYST

Atlantic National Bank, located in Jacksonville, Florida, has an excellent career opportunity for a Programmer Analyst with a minimum of 5 years OS/MVS experience. Heavy COBOL, MSA, and banking applications are required. If interested, send resume with salary history to:

**Director of Corporate Recruiting**
**ATLANTIC NATIONAL BANK**
**General Mail Center**
**Jacksonville, FL 32231**
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## HP3000 ANALYST

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## RESEARCH SCIENTIST

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Requires MS degree in Computer Science or Computer and Information Science or equivalent degree. Requires experience with logic programming, artificial intelligence, embedded expert systems and knowledge representations gained through Master's level thesis research or graduate level coursework in Database Management Systems, Information Science, Logic of Programming Languages and Algorithm design and analysis. Salary $3,075 per month.

Submit resumes to:

**Mr. Dick Hewetson**
**Minnesota Job Service**
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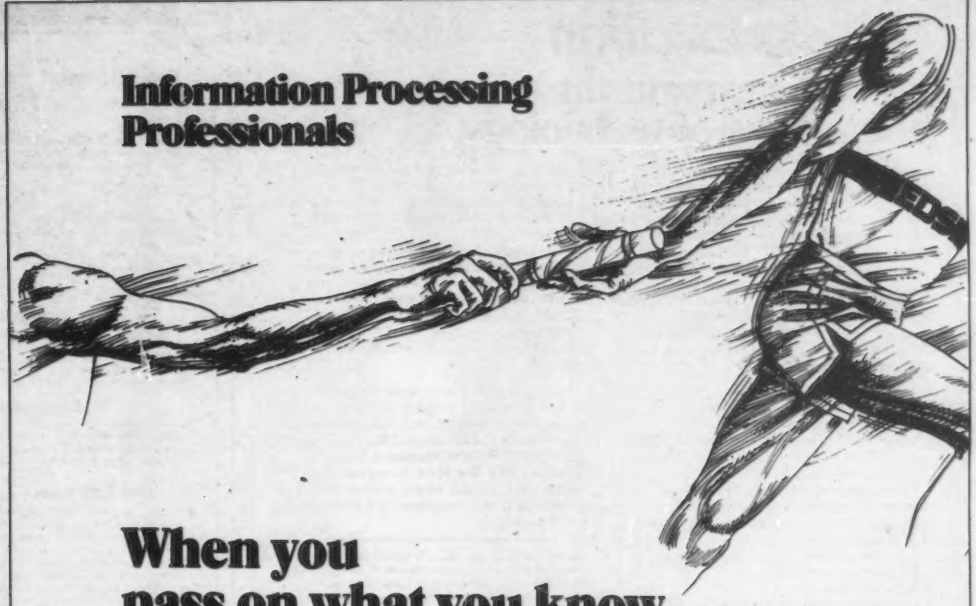
# Information Processing Professionals



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It's time to make your career move to the front with a fast-moving company. Electronic Data Systems (EDS) Corporation has grown to be the dominant company in the information processing field. We employ more than 40,000 people, generated over $947 million in annual revenues in 1984, and have an amazing growth rate of 25% per year. Daily transactions exceed six million from more than 50,000 on-line terminals, and we have created the nation's third largest communications network. In this environment of rapid growth, your opportunities for career advancement are virtually unlimited.

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The professionals we seek must have 3-5 years work experience and have a keen interest in both the technical and business aspects of information processing. Candidates must also have excellent comprehension of COBOL or ALC and recent IBM mainframe experience. Background in CICS, VSAM or in a data base environment is a plus. Although no previous teaching experience is required, you must have a professional image and be able to present your thoughts clearly in an organized manner. U.S. citizenship is required.

If you qualify, we would like to talk with you. Please send us your resume now. **Your career time is too valuable to waste.**

Richard Burges
Electronic Data Systems Corporation
Corporate Headquarters Recruiting
12200 Park Central Drive
Suite 200A, Dept. 1CW2735
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## COMPUTING AND INFORMATION SCIENCES
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This endowed distinguished professorship is designed for an individual with outstanding achievement in computing science and an earned doctorate in a relevant discipline. Preference will be given to candidates who combine a high level of scholarly research activity with effective teaching performance.

Trinity University is an independent institution with a substantial endowment. Trinity is committed to excellence in the liberal arts and sciences and in selected professional programs including Computing Science. The Department of Computing and Information Sciences has nearly 125 majors and 60 graduate students, who select either the M.S. in Computing Science or the M.S. in Information Science. Significant capital expenditures for computing hardware and software indicate the university's commitment to computing for the future. We especially encourage applications from female and minority candidates.

Nominations and applications should be received by November 15, 1985 and should be mailed to:

**Dr. Maurice L. Eggen, Chair**
**Department of Computing and Information Sciences**
**Trinity University**
**715 Stadium Drive**
**San Antonio, Texas 78284**
**(512) 736-7480**

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Bachelor's Degree or equivalent in technical area relevant to information systems development and at least 5 to 7 years of effective experience in information handling, including knowledge of hardware, software, data base management systems, interactive and transaction processing systems and information structures. Some experience in analysis and development of library computer systems and the ability to communicate technical information to non-technical audiences required. Send letter of application, resume and salary history to: **THE PENNSYLVANIA STATE UNIVERSITY, Employment Division, 117 Willard Bldg., Box CW-124, University Park, PA 16802. Application D/L, Oct. 14th.** An Equal Opportunity/Affirmative Action Employer

# Innovation

## Use it to expand the boundaries of technology.

When you're constantly challenged to break new ground, innovation becomes an integral part of your approach. That's what makes Lockheed Missiles & Space Company the ideal environment for technical professionals interested in advancing technology.

We offer a wide range of highly advanced programs representing a wellspring of opportunity for innovative professionals. Listed below is just a sampling of the many opportunities we have available. Look them over and then contact us to see where your talents can lead you.

- **Artificial Intelligence**
- **Data Base Management Systems**
- **Data Base Security**
- **Scientific Programmers/Analysts:** HP-3000/IMAGE DE; Manufacturing Applications; Sperry 1100 TELECON/CMS; Test Operations; VAX-11/750; VAX-11/780
- **Software Engineering:** Command Processing; Communication Processing; Data Routing & Compression; Mission Planning; Signal Processing; Simulation; Telemetry Formatting/Processing
- **Software Test**
- **Telecommunications Systems**
- **IMS Sr. Systems Programmers** – Configure and tune the IMS system to satisfy LMSC requirements, analyze/fix IMS system software failures, and develop new IMS software.
- **OS/MVS Sr. Systems Programmers** – Support, install and test MVS/SP system with the following IBM products: JES2, ISPF, ACF/VTAM, TSO, DFEP, SMPE. Also support the following non-IBM products: KOMAND, OMEGAMON, PANVALET, PANEXEC, DMS/OS, UCC1, SAS..
- **Field Service Engineer** – Must have expertise on DEC and VAX computer systems to resolve technical problems and perform engineering investigations of hardware and software leading to the repair of computer systems. A BSCS or BSEE and a background in computer hardware is required.

The challenge is waiting for you at Lockheed Missiles & Space Company. For immediate consideration, please forward your resume to **Professional Staffing, Dept. 653DN04, Lockheed Missiles & Space Company, P.O. Box 3504, Sunnyvale, CA 94088-3504.** We are an equal opportunity, affirmative action employer. U.S. citizenship is required.

You can also use your PC or Terminal to access our new JobNet On-Line Career Network. Simply call (408) 986-1292, press "return", and enter our password, "LMSC." Press "return" again and you will be on-line to review many additional career opportunities.

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Data Processing

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The rapid growth of Dynamic Control is about to enter a new dimension. The success of our total software solutions for the healthcare industry has brought major career potential to our employees. There has never been a better time to join us.

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This groundbreaking opportunity involves plenty of travel and broad systems exposure, and requires a "big picture" mentality grounded in solid knowledge of hardware architecture. Visit customer sites, identify equipment requirements and assist in producing proposals, based on your proven abilities in configuring and presenting IBM System 38 and 36 via direct client contact. Three-five years experience suits you for this marketing support role in IBM hardware sales and installation, along with cross-industry hardware knowledge.

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You will perform physical installation planning at customer sites, analyse U.P.S. requirements, and answer questions posed by customers and marketing reps. A minimum of 1 year experience configuring IBM System 38, 34, and 36 operational equipment, plus a good background in IBM physical planning, electrical, and equipment installation required.

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You will devise equipment configurations, create five-year equipment plans, forecast equipment annuities, take part in proposal development, and handle requests for purchase. This opportunity requires exposure to the IBM System 38—in addition to knowledge of room set-up procedures and hardware naming conventions.

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Provide programming support to internal systems, maintain system utilities and function as interface to IBM in addition to new system and product installation responsibilities. IBM S/38 operations and programming knowledge required.

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Hardware Design Engineers with experience in the 68000 family, power supply evaluation, peripheral controller and peripheral evaluation.

Requires a BSEE/MSEE or equivalent with a minimum of 3 years experience in logic design on microprocessor based commercial computers.

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Mechanical Design Engineers with experience in electro-mechanical packaging of small computer products.

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### Software Systems Engineers

Software Design Engineers with experience in microprocessor systems, C Language, Data Base Management Software and UNIX operating systems internals.

A BS/MS in Computer Science or related field or equivalent experience is desired, plus a minimum of 3 years experience with microprocessor systems.

Four-Phase offers competitive salaries and a comprehensive benefits package including profit sharing, dental insurance, 401K Plan, vision care and tuition reimbursement. If you are one of the innovators of today, we invite you to send your resume to: **Personnel Manager, Motorola Four-Phase Systems, Phoenix Operation, 3013 S. 52nd St., P.O. Box 22345, Tempe, Arizona 85282.**

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Key technical support position during installation and for on going support of new INFOCEL Financial Management and Personnel Systems. Desire degree plus minimum 2 years programming experience or equivalent combination of education and experience. Desire 1 year local government finance experience with either INFOCEL and/or PRIME computers. Opportunity to develop leadership in innovative, fast growing MIS environment. Resume and salary requirements to:

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Please forward resume and salary requirements to:

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## SYSTEMS PROGRAMMER
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Position seeks Bachelor's degree in Computer Science or Mathematics and 3-5 years of recent experience as a Systems Programmer in an IBM OS MVS or MVS-XA environment. Experience in CICS and/or VM is highly desirable. Candidate should have exposure to VTAM/NCP.

SPPCo supports a multiple CPU environment including a 3083J and (2) 303X's. Micration to VM-XA and MVS-XA is scheduled for 2nd and 3rd quarter of '86.

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HELP WANTED:
**Systems Software Engineer, Manager**

PLEASE SEND RESUME TO:
EMPLOYMENT SECURITY DEPARTMENT
EMPLOYMENT SERVICE DIVISION
M/S KG-11
ATTENTION: AEC COORDINATOR #45606
OLYMPIA, WASHINGTON 98504

**JOB DESCRIPTION:** Localization Systems Engineering Manager for France: Manages subdivision of software company to localize U.S. designed and produced software for micro computers and processors for the French market. Manages other software engineers to analyze what software design changes must be made for French market and French computers and to design, implement, and test the software and independent tools. Works with MS-DOS operating system, utilizing "C" and Assembly languages. Communicates with subsidiary of company in France re software needs.

**REQUIREMENTS:** B.A. OR B.S. IN COMPUTER SCIENCE, MATHEMATICS, ELECTRICAL ENGINEERING OR PHYSICS. SIX MONTHS EXPERIENCE IN SOFTWARE LOCALIZATION ENGINEERING FOR FRANCE, UTILIZING MS-DOS OPERATING SYSTEM AND 'C' AND ASSEMBLY LANGUAGES. MUST BE ABLE TO FLUENTLY SPEAK, WRITE AND READ FRENCH AND ENGLISH. MUST BE FAMILIAR WITH CURRENT COLLOQUIALISMS, IDIOMS AND JARGON OF THE FRENCH, ESPECIALLY AS IT PERTAINS TO BUSINESS USAGE.

**SALARY:** $35,500 per annum.

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**SOFTWARE PROFESSIONALS**

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- UNIX/C
- ACP/TPF
- IVW Communications (NCP/VTAM)
- Real-time Process Control

Contact Information Industries, Inc. today through our National Career Network: 800-821-5146 (CR). This requires any micro with a 300/1200 Baud ASCII modem. If you do not have access to a micro, you can call our toll-free number: 800-874-7534, ext. 2022 during business hours. In Missouri, call: 816-444-8100.

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State-of-the-Art dual IBM 3090's MVS/XA database shop is currently searching for specialists in:

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Call Camille Hankins at (704) 375-0600 or send resume to:

212 S. Tryon Street, Suite 1350
Charlotte, NC 28281

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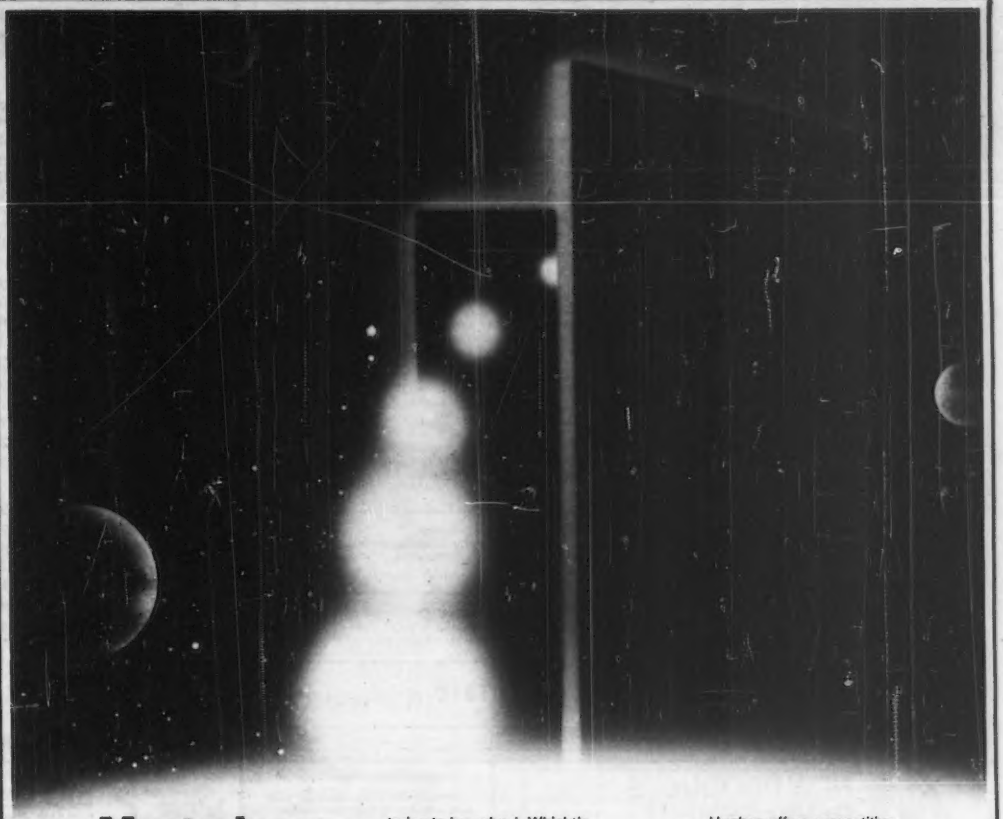

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Mechanical Engineers
Microwave Systems Engineers
Circuit Design Engineers

Hughes offers competitive salaries and outstanding benefits. To apply, please send your resume in confidence to: Dan Frownfelter, Hughes Space & Communications, Dept. WC-9E, S41/A300, P.O. Box 92919, Los Angeles, CA 90009. Proof of U.S. citizenship required. Equal opportunity employer.

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# PROGRAMMERS

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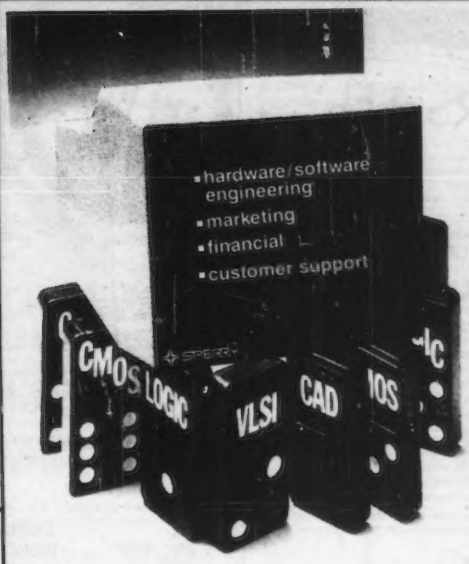


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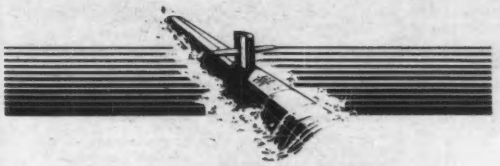
# SYSTEMS SOFTWARE ENGINEERS

General Dynamics Data Systems Division provides data processing support throughout the General Dynamics Corporation, including the Electric Boat Division, builder of the SSN-688 and Trident submarines, and the Land Systems Division, a leading designer and producer of advanced combat tanks.



## Systems Engineers Newport, Rhode Island

### Submarine Advanced Combat System/Trident Program

Our current requirements call for Lead Systems Engineers to support Trident Command & Control Systems (CCS) programs. These positions require 5 or more years' experience with Trident CCS or AN/UYK-7 based systems. An advanced degree is preferred with systems or integration experience a plus.

### Trident CCS Off-Line Data Reduction

Our current requirements also call for Systems Engineers to support off-line data reduction functions developing and maintaining a variety of data extraction programs. These positions require at least one year's experience in off-line reduction with a background in CMS-2Y Navy language and PL-1. A technical degree (preferably software engineering or computer science) required; Trident CCS experience a plus.

To apply for the above positions, please send resume and salary history to: B.J. Breen, Division Vice President and Director, General Dynamics Data Systems Division Eastern Center, 100 Winnenden Road, Norwich, CT 06360.

## Software Engineers Troy, Michigan

Supporting the design and development of advanced Vehicle Electronics (Vetronics) systems, responsibilities will include software development for military real-time systems (Communications, Vetronics, Command & Control, etc.) and the development of concepts and specifications for embedded computer systems supporting future land combat vehicles. Requires minimum 2 years' experience in any of the following: LANGUAGES – FORTRAN. JOVIAL ASSEMBLER, Ada, LISP, PROLOG, PASCAL; PROCESSORS – Motorola 68000, VAX 11/780, 1750A and 1553 databus; APPLICATIONS – Communications, Command & Control, Battlefield Management, Machine Vision, Artificial Intelligence and Robotics in a real-time environment.

To apply for the above position, please send resume and salary history to: David Carey, General Dynamics Land Systems Division, MZ 435-04-38, 6000 E. 17 Mile Road, Sterling Heights, MI 48078.

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Submit resume with names and addresses of three references by December 31, 1985 to:

Professor Nicholas Kira, III, Chairman
Search and Screen Committee
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Engineering & Technology at Indianapolis
P.O. Box 647
1201 E. 38th Street
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**Frederick L. Stout**
**ACP/TPF Product Group**
**COMPUTER TASK GROUP**
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We offer an excellent benefit package including medical, life, accidental death, disability and profit sharing plans. You will additionally receive 25 working days vacation, 15 holidays, free furnished housing, annual return home travel, paid relocation expenses, plus eligibility for present Federal Income Tax exclusions.

Please send resume, with present salary history, to Personnel Dept. CW-9/30, SYSOREX INTERNATIONAL, Inc., 10590 N. Tantau Ave., Cupertino, CA 95014. U.S. CITIZENSHIP REQUIRED. Principals only, please.

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**Personnel Office**
**Auburn Faith Community Hospital**
**P.O. Box 5992**
**Auburn, CA 95604**

## COMPUTER & INFORMATION SCIENCE DEPARTMENT CHAIRMAN

Applications are being accepted until November 1, 1985 for Dept. Chairman, CIS at Troy State University in Montgomery (TSUM). Doctorate plus administrative and teaching experience required. Available January 1, 1986. Send vita, official transcripts, three letters of reference relating to requirements to Dr. Fred Stewart, TSUM, P.O. Drawer 4419, Montgomery, AL 36195.

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- Computer Science degree desired

This position offers an excellent opportunity for further growth and development. Salary commensurate with ability and experience. Winston-Salem, NC location with excellent benefits package. Send resume and salary requirements, in confidence, to: **Mr. Jeff Christopher, Distribution Systems Recruiter, R.J. REYNOLDS INDUSTRIES, INC., World Headquarters Bldg., 1100 Reynolds Blvd., Winston-Salem, NC 27102.**

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Professor John A. Lockwood
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Submit resumes to:

**Mr. Dick Hewetson**
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**Request for Proposal No. 1033,** due Monday, October 21, 1985 at 3:30 p.m. for the acquisition of a multiprogramming, minicomputer based system for MISSISSIPPI GULF COAST JUNIOR COLLEGE.

**Request for Proposal No. 1034,** due Thursday, October 17, 1985 at 3:30 p.m. for the acquisition of a compatible system to upgrade and replace the System/34 computing facilities at COPIAH-LINCOLN JUNIOR COLLEGE.

**Request for Proposal No. 1035,** due Thursday, October 17, 1985 at 3:30 p.m. for the acquisition of a multiprogramming minicomputer for GOLDEN TRIANGLE VOCATIONAL-TECHNICAL CENTER.

**Request for Proposal No. 1036,** due Friday, October 11, 1985 at 3:30 p.m. for the acquisition of a memory and processor upgrade of a NCR Tower 1632 for the JOINT LEGISLATURE COMMITTEE ON PERFORMANCE EVALUATION AND EXPENDITURE REVIEW (PEER).

**Request for Proposal No. 1037,** due Thursday, October 10, 1985 at 3:30 p.m. for the acquisition of optical mark reader systems for the UNIVERSITY OF MISSISSIPPI and MISSISSIPPI STATE UNIVERSITY.

**Request for Proposal No. 1038,** due Monday, October 21, 1985 at 3:30 p.m. for the acquisition of a one (1) MB memory upgrade for a MARIS PDP-11/24 for the MISSISSIPPI RESEARCH AND DEVELOPMENT CENTER.

**Request for Proposal No. 1039,** due Monday, October 21, 1985 at 3:30 p.m. for the acquisition of a color pen plotter for the MISSISSIPPI RESEARCH AND DEVELOPMENT CENTER.

**Request for Proposal No. 1040,** due Tuesday, October 22, 1985 at 3:30 p.m. for the acquisition of an upgrade from a Honeywell DPS 6/54 to a 6/94 or compatible system for the MISSISSIPPI RESEARCH AND DEVELOPMENT CENTER.

Detailed specifications may be obtained from the CDPA office. The CDPA reserves the right to reject any and all bids and proposals and to waive informalities.

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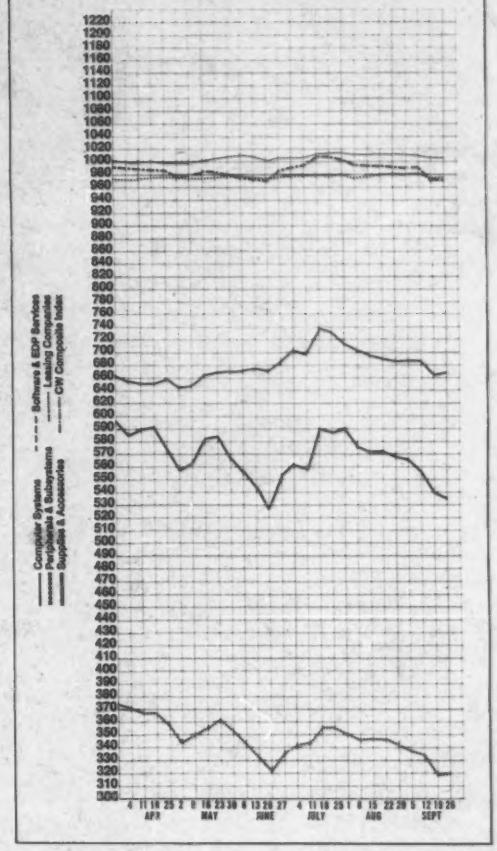


# Computerworld Stock Trading Summary

TRADE QUOTES

All statistics compiled, computed and formatted by TRADE QUOTES, INC Cambridge, Mass. 02139

CLOSING PRICES WEDNESDAY, SEPTEMBER 25, 1985

### COMPUTER SYSTEMS

| E | | PRICE 1985 RANGE (1) | CLOSE SEP 25 | WEEK NET CHNGE | WEEK PCT CHNGE |
|---|---|---|---|---|---|
| O | ALPHA MICROSYSTEMS | 9- 12 | 5 1/8 | + 1/2 | +10.8 |
| O | ALTOS COMPUTER SYST | 7- 16 | 10 1/2 | + 5/8 | +6.3 |
| A | AMDAHL CORP | 10- 18 | 12 1/8 | - 3/8 | -3.0 |
| O | APPLE COMPUTER INC | 14- 31 | 15 7/8 | - 3/8 | -2.3 |
| N | AT&T | 18- 25 | 20 7/8 | 0 | 0.0 |
| N | BURROUGHS CORP | 51- 88 | 85 7/8 | +2 3/4 | +3.3 |
| O | COMPAQ COMPUTER CP | 6- 12 | 9 1/2 | - 1/4 | -2.5 |
| O | COMPUTER AUTOMATION | 3- 9 | 6 1/2 | - 1/2 | -7.1 |
| A | COMPUTER CONSOLES | 5- 20 | 6 5/8 | - 1/8 | -1.8 |
| N | CONTROL DATA CORP | 18- 38 | 18 | - 3/4 | -4.0 |
| O | CONVERGENT TECHNOL | 5- 17 | 7 3/4 | + 1/4 | +3.3 |
| O | CPT CORP | 3- 13 | 8 1/8 | + 1/8 | +1.5 |
| N | CRAY RESEARCH INC | 23- 91 | 47 1/2 | +1 3/8 | +3.0 |
| O | DAISY SYSTEMS CORP | 21- 38 | 22 1/4 | - 1/4 | -1.1 |
| N | DATA GENERAL CORP | 31- 78 | 36 1/8 | -1 1/8 | -2.9 |
| N | DATAPOINT CORP | 5- 23 | 4 5/8 | - 3/8 | -7.5 |
| N | DIGITAL EQUIPMENT | 68- 138 | 107 3/8 | +2 3/4 | +2.6 |
| A | EECO INC | 12- 18 | 14 1/2 | - 1/8 | -0.8 |
| N | ELECTRONIC ASSOC. | 3- 8 | 4 1/2 | - 1/8 | -2.7 |
| N | FLOATING POINT SYST | 19- 35 | 23 1/8 | -1 7/8 | -8.9 |
| N | FOXBORO | 24- 34 | 23 1/4 | - 1/2 | -1.8 |
| N | GOULD INC | 20- 32 | 28 3/4 | - 7/8 | -3.1 |
| N | HARRIS CORP | 25- 39 | 33 7/8 | - 1/2 | -1.0 |
| N | HEWLETT-PACKARD CO | 31- 46 | 32 | -1 1/2 | -4.4 |
| N | HONEYWELL INC | 93- 97 | 61 1/2 | -1 3/8 | -2.2 |
| N | IBM | 118-138 | 124 | -3 1/2 | -2.7 |
| O | IPL SYSTEMS INC | 1- 4 | 1 5/8 | - 1/8 | -7.1 |
| N | ITT CORP | 24- 37 | 32 3/8 | - 3/8 | -1.1 |
| N | M/A-COM INC | 18- 24 | 17 3/8 | + 3/8 | +2.2 |
| N | MANAGEMENT ASSIST | 2- 28 | 2 5/8 | - 1/8 | -4.5 |
| N | MATSUSHITA ELEC(ADR) | 68- 98 | 89 7/8 | +1 3/4 | +2.0 |
| N | MODULAR COMPUTER SYS | 0- 10 | 0 1/8 | 0 | 0.0 |
| O | MOHAWK DATA SCI | 5- 15 | 5 1/8 | + 1/8 | +10.0 |
| N | MOTOROLA INC | 28- 44 | 33 3/4 | + 1/4 | +0.7 |
| N | NAT'L SEMICONDUCTOR | 10- 17 | 12 1/2 | + 1/8 | +1.0 |
| N | NBI INC | 13- 21 | 13 1/2 | - 1/4 | -1.8 |
| N | NCR | 23- 38 | 32 1/8 | + 3/4 | +2.3 |
| N | PERKIN-ELMER | 22- 36 | 25 5/8 | + 5/8 | +2.5 |
| N | PRIME COMPUTER INC | 15- 26 | 17 | -1 1/8 | -6.2 |
| N | SPERRY CORP | 35- 58 | 48 1/4 | - 1/4 | -0.5 |
| O | STRATUS COMPUTER INC | 9- 18 | 16 1/4 | 0 | 0.0 |
| O | TANDEM COMPUTERS INC | 14- 28 | 14 1/8 | - 3/4 | -5.0 |
| N | TANDY CORP | 24- 37 | 32 3/8 | -2 1/4 | -6.4 |
| O | TELEVIDEO SYSTEMS | 2- 5 | 2 1/8 | 0 | 0.0 |
| O | TELXON CORP | 7- 18 | 14 3/4 | 0 | 0.0 |
| N | TEXAS INSTRUMENTS | 98-148 | 93 | -1 7/8 | -1.9 |
| A | ULTIMATE CORP. | 9- 24 | 11 5/8 | - 1/8 | -1.0 |
| O | VECTOR GRAPHICS INC | 0- 1 | 1/8 | - 1/16 | -12.4 |
| A | WANG LABS "B" | 19- 32 | 18 1/4 | + 1/4 | +1.3 |
| A | WANG LABS "C" | 19- 32 | 18 3/4 | + 1/4 | +1.3 |
| N | XEROX CORP | 47- 98 | 30 1/4 | - 3/4 | -1.6 |

### LEASING COMPANIES

| | | | | | |
|---|---|---|---|---|---|
| N | COMDISCO INC | 8- 20 | 18 3/4 | + 1/8 | +0.8 |
| O | CONTINENTAL INFO SYS | 3- 12 | 11 1/4 | + 3/4 | +7.1 |
| O | PINALCO GROUP INC | 2- 7 | 4 7/8 | + 1/4 | +5.4 |
| O | PHOENIX AMERICAN INC | 1- 3 | 2 1/8 | - 1/8 | -5.5 |
| O | SELECTERM INC | 0- 14 | 8 1/4 | 0 | 0.0 |
| N | U.S. LEASING | 32- 43 | 31 3/4 | - 1/4 | -0.7 |

### COMPONENTS

| | | | | | |
|---|---|---|---|---|---|
| N | ADVANCED MICRO DEV | 23- 41 | 28 1/4 | - 7/8 | -3.2 |
| O | ADV'D SEMICONDUCTOR | 8- 23 | 7 1/2 | 0 | 0.0 |
| N | ANALOG DEVICES INC | 18- 25 | 21 | +1 | +5.0 |
| O | ANALOGIC CORP | 8- 18 | 12 | - 5/8 | -4.8 |
| N | APPLIED MAGNETICS CP | 9- 18 | 12 1/8 | - 1/4 | -2.0 |
| O | HADCO CORP | 3- 10 | 4 1/8 | + 1/8 | +3.1 |
| O | MICRO MASK INC | 8- 14 | 8 3/8 | - 1/8 | -1.8 |
| N | TERADYNE | 20- 35 | 21 | - 5/8 | -2.9 |

EXCH: N=NEW YORK; A=AMERICAN; P=PACIFIC; B=BOSTON; L=NATIONAL; R=MIDWEST; O=OVER-THE-COUNTER
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|---|---|---|---|---|---|
| O | ADVANCED COMP TECH | 2- 4 | 3 1/8 | 0 | 0.0 |
| N | ADVANCED SYSTEMS INC | 8- 20 | 14 | +1 1/8 | +8.7 |
| N | AGS COMPUTERS INC | 10- 17 | 15 7/8 | - 3/8 | -2.3 |
| O | AMERICAN SOFTWARE | 7- 12 | 10 | 0 | 0.0 |
| N | ANACOMP INC | 1- 4 | 3 | + 1/8 | +4.3 |
| O | ANALYSTS INTL CORP | 5- 11 | 8 | - 1/2 | -5.8 |
| N | APPLIED DATA RES | 20- 40 | 18 3/4 | +5 7/8 | +45.6 |
| O | ASHTON TATE | 6- 13 | 11 7/8 | + 2/8 | +3.2 |
| N | BEI COMPUTER SYSTEMS | 10- 24 | 11 1/2 | +1 1/4 | +12.1 |
| N | ASTRADYNE COMP IND | 1- 7 | 1 7/8 | - 3/4 | -28.5 |
| N | AUTOMATIC DATA PROC | 35- 59 | 59 7/8 | - 1/2 | +0.8 |
| O | COMPUTER ASSOC INT'L | 18- 30 | 23 1/2 | - 1/2 | +2.0 |
| O | COMPUTER HORIZONS | 5- 11 | 11 1/2 | + 1/4 | +2.2 |
| O | COMPUTER NETWORK | 5- 10 | 7 | - 1/8 | -1.7 |
| N | COMPUTER SCIENCES | 12- 24 | 23 3/4 | +1 1/2 | +6.7 |
| O | COMPUTER TASK GROUP | 10- 20 | 17 3/4 | + 1/8 | +0.7 |
| O | COMPUTER USAGE | 1- 3 | 2 1/2 | 0 | 0.0 |
| O | COMPUTONE SYSTEMS | 4- 11 | 3 3/8 | + 1/2 | +10.2 |
| O | COMSERV CORP | 1- 8 | 2 7/8 | 0 | 0.0 |
| O | COMSHARE | 0- 10 | 6 7/8 | - 1/8 | -1.3 |
| N | CULLINET SOFTWARE | 18- 33 | 17 | + 3/8 | +2.2 |
| O | CYCARE SYSTEMS INC | 18- 27 | 20 1/4 | + 1/4 | +1.2 |
| O | HOGAN SYSTEM INC | 4- 10 | 9 1/4 | - 1/8 | -1.3 |
| N | GENERAL ELECTRIC CO | 93- 93 | 97 1/4 | -2 1/4 | -2.7 |
| N | GENL MOTORS E (EDS) | 17- 47 | 37 7/8 | +1 3/4 | +4.8 |
| N | GTE CORP | 38- 45 | 38 5/8 | - 5/8 | -1.5 |
| N | INFORMATICS GENERAL | 13- 27 | 28 7/8 | 0 | 0.0 |
| O | INFORMATION SCIENCE | 1- 8 | 2 | 0 | 0.0 |
| O | INFOTRON SYSTEMS CP | 15- 25 | 17 1/4 | -2 3/4 | -13.7 |
| O | KEANE ASSOCIATES | 8- 18 | 14 | + 1/4 | +1.8 |
| N | LOGICON | 24- 38 | 33 3/4 | +2 1/4 | +7.1 |
| O | LOTUS DEVELOPMENT CP | 17- 34 | 18 3/4 | + 1/2 | +2.8 |
| O | MCI COMMUNICATIONS | 7- 11 | 8 3/4 | + 1/4 | +2.8 |
| O | MNGT SCI AMER INC | 8- 18 | 12 1/4 | + 1/8 | +1.0 |
| O | MATHEMATICAL APP GRP | 2- 8 | 3 1/4 | + 1/4 | +18.8 |
| O | MICOM SYSTEMS INC | 14- 42 | 18 | - 1/2 | -3.0 |
| O | MICROPRO INT'L CP | 2- 4 | 2 3/8 | + 1/4 | +11.7 |
| O | NATIONAL DATA CORP | 9- 15 | 13 3/4 | +1 3/4 | +14.5 |
| O | ON-LINE SOFTWARE INT | 4- 10 | 6 1/2 | - 1/4 | -3.7 |
| O | PANSOPHIC SYSTEMS | 11- 25 | 20 1/4 | +1 1/4 | +6.6 |
| N | PLANNING RESEARCH | 8- 17 | 16 | + 3/8 | +2.3 |
| O | POLICY MGMT SYSTS CP | 18- 35 | 17 1/2 | -3 1/4 | -15.8 |
| O | PROGRAMMING & SYS | 4- 8 | 8 7/8 | 0 | 0.0 |
| O | REYNOLDS & REYNOLD | 28- 44 | 38 1/4 | - 3/4 | -1.9 |
| O | DST CORP | 11- 18 | 18 1/2 | + 1/4 | +1.3 |
| O | SHARED MEDICAL SYST | 24- 35 | 34 1/2 | +1 1/2 | +4.5 |
| O | SCIENTIFIC COMPUTERS | 9- 12 | 11 3/4 | - 1/4 | -4.1 |
| O | SOFTWARE AG | 11- 22 | 19 7/8 | + 1/2 | +2.2 |
| O | UMS CORP | 10- 14 | 11 1/2 | + 1/4 | +2.2 |
| N | UCCEL | 8- 17 | 16 3/8 | +1 | +6.5 |

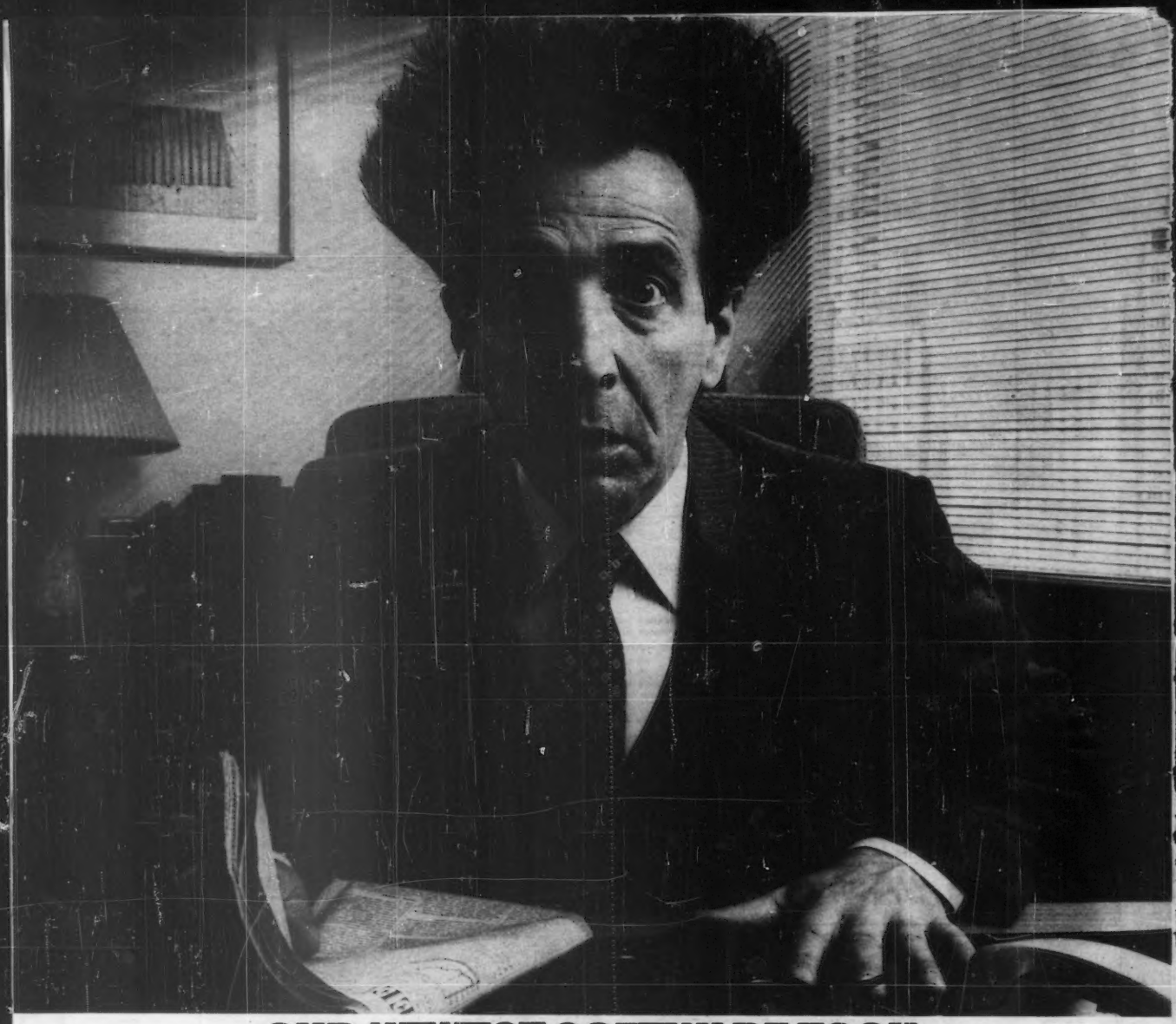
### PERIPHERALS & SUBSYSTEMS

| | | | | | |
|---|---|---|---|---|---|
| P | AM INTERNATIONAL | 3- 8 | 3 1/2 | 0 | 0.0 |
| A | ANDERSON JACOBSON | 3- 11 | 7 1/2 | 0 | 0.0 |
| O | ART RESEARCH INC | 7- 23 | 14 3/4 | + 1/8 | +0.8 |
| O | AUTO-TROL TECHNOLOGY | 6- 15 | 9 5/8 | - 1/8 | -1.3 |
| O | AVANT-GARDE COMPUTNG | 6- 28 | 8 | - 1/2 | -5.8 |
| O | BANCTEC INC | 5- 12 | 8 7/8 | + 1/2 | +6.1 |
| O | BEEHIVE INT'L | 1- 2 | 1/4 | 0 | 0.0 |
| N | BOLT-BERANEK & NEW | 18- 31 | 28 3/4 | - 1/2 | -1.7 |
| O | CAMBEX CORP | 1- 3 | 1 | - 1/8 | -11.1 |
| N | CENTRONICS DATA COMP | 9- 12 | 4 3/8 | - 1/8 | -2.7 |
| A | CETEC CORP | 0- 10 | 7 1/4 | 0 | 0.0 |
| A | COMMTRONICS | 4- 7 | 4 5/8 | + 3/8 | +8.8 |

| E | | PRICE 1985 RANGE (1) | CLOSE SEP 25 | WEEK NET CHNGE | WEEK PCT CHNGE |
|---|---|---|---|---|---|
| N | COMPUGRAPHIC CORP | 24- 37 | 26 1/4 | + 1/2 | +2.1 |
| O | COMPUTER TRANSCEIVER | 1- 4 | 3/8 | 0 | 0.0 |
| N | COMPUTERVISION CORP | 12- 46 | 11 5/8 | -1 | -7.9 |
| N | COMRESS CORP | 13- 18 | 12 7/8 | - 3/8 | -2.8 |
| A | DATAPRODUCTS CORP | 11- 24 | 12 | - 1/8 | +1.0 |
| A | DATARAM CORP | 3- 7 | 5 | 0 | 0.0 |
| O | DATA SWITCH CORP | 4- 8 | 5 3/8 | - 1/4 | -4.4 |
| O | DATUM INC | 5- 9 | 8 1/4 | 0 | 0.0 |
| O | DECISION DATA COMPUT | 8- 18 | 10 1/4 | - 1/8 | -1.2 |
| O | DOCUTEL-OLIVETTI | 3- 8 | 5 3/8 | 0 | 0.0 |
| O | EXIDATA, INC | 5- 22 | 3 1/8 | + 3/8 | +13.8 |
| O | EVANS & SUTHERLAND | 6- 19 | 18 | + 3/8 | +2.1 |
| O | GANDALF TECHNOLOGIES | 5- 20 | 9 3/8 | - 1/8 | -1.3 |
| N | GENRAD, DATA COMM IND | 11- 25 | 11 1/4 | - 1/8 | -1.1 |
| N | HAZELTINE CORP | 3- 29 | 29 1/2 | - 3/8 | -1.4 |
| O | ICOT CORP | 6- 17 | 9 | + 3/8 | +8.6 |
| O | INFORMATION INTL INC | 6- 15 | 14 | +1 | +7.6 |
| N | INTECOM INC | 5- 38 | 6 7/8 | + 3/8 | +8.3 |
| O | INTEL CORP | 7- 26 | 25 1/4 | - 1/4 | -0.9 |
| A | LUNDY ELECTRONICS | 4- 16 | 12 | - 5/8 | +4.8 |
| O | MEGADATA CORP | 4- 13 | 6 1/4 | 0 | 0.0 |
| A | MSI DATA CORP | 5- 30 | 9 7/8 | + 1/2 | +5.8 |
| N | MAGNUM CORP | 13- 27 | 26 1/8 | + 5/8 | +2.4 |
| O | NETWORK SYSTEMS CORP | 24- 45 | 34 7/8 | +1 | +3.1 |
| N | NO AMERICAN PHILIPS | 30- 42 | 33 3/4 | +1 1/2 | +4.6 |
| N | NORTHERN TELECOM LTD | 1- 38 | 32 5/8 | +1 1/4 | -3.8 |
| O | ONEX | 1- 3 | 3/8 | 0 | 0.0 |
| N | PARADYNE CORP | 8- 14 | 8 3/8 | - 1/2 | -5.6 |
| A | PENRIL CORP | 5- 28 | 6 1/2 | + 3/8 | +6.1 |
| N | PLESSEY CO (ADR) | 8- 23 | 21 1/2 | +1 1/4 | +6.1 |
| O | PRINTRONIX INC | 8- 17 | 11 3/8 | - 3/8 | -3.1 |
| O | QMS INC | 3- 11 | 9 1/4 | - 1/8 | -2.6 |
| O | RANTEK CORP | 3- 17 | 8 | - 1/8 | -1.5 |
| N | RECOGNITION EQUIP | 3- 51 | 8 1/8 | - 1/8 | -1.5 |
| O | SANDERS ASSOCIATES | 11- 37 | 35 3/8 | + 1/4 | +0.8 |
| O | SCAN-TRON CORP | 9- 18 | 15 1/4 | + 1/4 | +1.6 |
| N | SCIENTIFIC ATLANTA | 7- 16 | 11 7/8 | +1 1/8 | +10.5 |
| O | SEAGATE TECHNOLOGY | 2- 12 | 5 7/8 | - 1/8 | -2.0 |
| N | STORAGE TECHNOLOGY | 1- 3 | 2 | + 1/8 | +6.6 |
| O | SYKES DATATRONICS | 0- 11 | 1/8 | 0 | 0.0 |
| A | T BAR INC | 5- 20 | 9 7/8 | + 1/4 | +4.6 |
| A | TAS PRODUCTS CO | 4- 18 | 16 7/8 | - 3/8 | -2.1 |
| O | TANDON CORP | 0- 12 | 3 1/2 | 0 | 0.0 |
| O | TEC INC | 8- 17 | 9 1/4 | - 1/8 | -1.4 |
| N | TEKTRONIX INC | 30- 62 | 50 5/8 | + 3/8 | +0.7 |
| N | TELEX | 1- 44 | 44 1/4 | +1 1/8 | +2.6 |
| O | TESDATA SYSTEMS CP | 1- 23 | 7/8 | 0 | 0.0 |
| N | TIMEPLEX INC | 3- 21 | 10 3/8 | + 1/8 | +0.8 |
| O | TITAN CORP | 5- 8 | 8 1/8 | + 1/8 | +1.6 |
| O | VISUAL TECHNOLOGY | 1- 10 | 1 1/8 | - 1/16 | -5.3 |

### SUPPLIES & ACCESSORIES

| | | | | | |
|---|---|---|---|---|---|
| N | AMERICAN BUS FRMS | 21- 29 | 29 7/8 | 0 | 0.0 |
| A | BARRY WRIGHT | 18- 33 | 18 1/2 | + 3/4 | +3.7 |
| A | DUPLEX PRODUCTS INC | 12- 20 | 17 5/8 | 0 | 0.0 |
| N | ENNIS BUS. FORMS | 16- 30 | 18 1/4 | +1 5/8 | +9.7 |
| N | 3M COMPANY | 74- 86 | 74 5/8 | + 1/8 | +0.1 |
| N | MOORE CORP LTD | 12- 22 | 17 3/8 | - 3/8 | -2.0 |
| O | STANDARD REGISTER | 19- 32 | 32 1/4 | + 1/4 | +0.7 |
| N | WALLACE COMP SERVICE | 28- 40 | 33 1/4 | + 1/4 | +0.7 |



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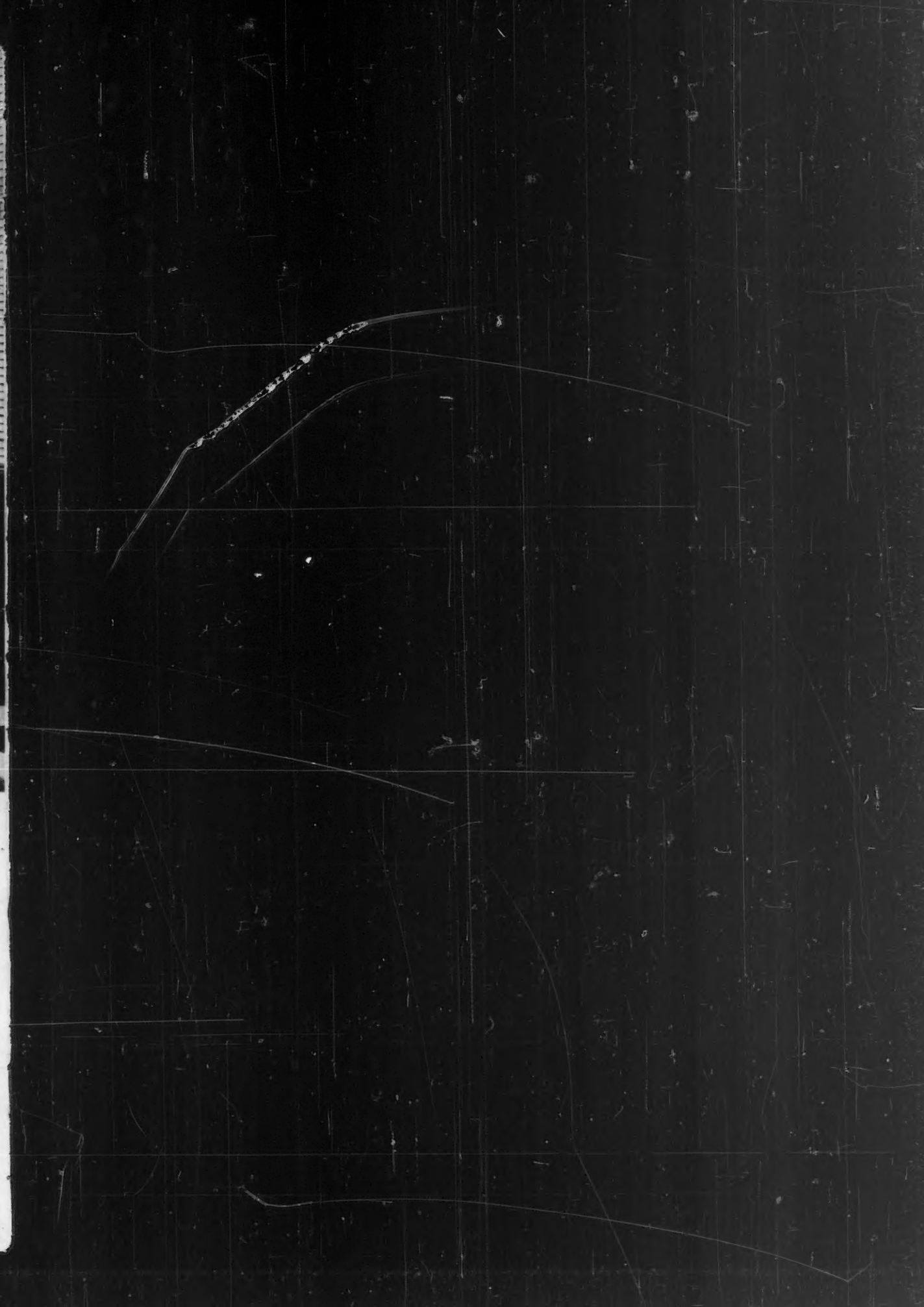
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